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Round table conference on Streptomyces, August 4–5, 1958, Stockholm, Sweden. *ex* **7th International Congress of Microbiology.**—*Int. Bull. bact. Nom. Taxon.*, **9**, 1, pp. 13–34; 2, pp. 57–104, 1959.

In this series of papers on the evaluation of criteria for the taxonomy of *Streptomyces*, D. GOTTLIEB outlines the agenda.

In the Protocol F KÜSTER, summarizing the meeting, notes that recent systematic work has dealt mainly with organisms producing antibiotics. The most important problem is considered to be the careful definition of species and a 1st step should be the designation and description of neotypes for many earlier spp.

Attention was drawn to the need to define the media used for identification and maintenance of cultures.

For characterization, consideration of morphology of the colony is desirable [**38**, p. 69], and the following definitions of mycelia were agreed: 'substratum mycelium: the totality of the hyphae growing in the agar or solution; aerial mycelium: the totality of the mycelium parts which rise above the surface of the substratum; vegetative mycelium, the totality of the mycelium not dividing into spores; and sporophores, the parts of the mycelium dividing into spores'. The importance of sporophore structure and the method of spore formation (whether by segmentation or fragmentation) was agreed. Spore morphology by ordinary methods was considered to be of limited value but a description of spores as shown by the electronic microscope is essential. Colour of the aerial mycelium, but not of the substratum mycelium of the medium, is considered a diagnostic character. Other diagnostic characters are reduction of nitrates, gelatin liquefaction (if time required is stated), and possibly mild peptonization.

The value of carbohydrate and nitrogen utilization tests are uncertain; production of, and sensitivity to antibiotics are not diagnostic.

M. WELSCH spoke briefly on production of and sensitivity to antibiotics, on specific actinophages, and genetic interactions between strains.

R. HÜTTER dealt with identification [loc. cit.].

In introductory remarks E. KÜSTER dwelt on the need for one system of classification and for a culture collection.

N. A. KRASIL'NIKOV discussed [in German] the possibility of classifying actinomycetes as producers of antibiotics [cf. **36**, p. 546].

The use of punched cards as an aid to classification was advocated [in German] by K. H. WALLHÄUSER, with some examples [3 fig.].

S. A. WAKSMAN gave a key to 3 fam. and 10 gen. of Actinomycetales, with a discussion of diagnostic features [**37**, p. 148]. He advocated using a combination of ecological, morphological, and physiological characters.

H. J. KUTZNER spoke [in German] on his own methods of classification, which follows along similar lines. Criteria for improvement in the classification given by E. BALDACCI [**35**, p. 793; **37**, p. 140] were microscopic structure, particularly of sporophores, and ultra-morphology of spores, the choice of characters least subject to variation and breakdown products produced. He also mentioned standardization of media.

The contribution of R. CIFERRI was on the general principles of taxonomy in relation to the subject, followed by the proposal of some 'rules': Latin binomials for 'series' with the use of numbers or letters for infra serial clones or strains; at least 2 characters in different categories for 'species' status, 1 or few allied character differences making only for strain differentiation; species to be checked by specialists; and cultures to go in a type collection.

Ž. P. Tešić recommended 'classification units' above and below the present levels, proposed that the system be based primarily on morphological characters, and gave his arrangement of families and genera.

The procedure for the comparative study of criteria was outlined by E. Küster; 34 participants have agreed to follow this standard procedure in the examination in their own laboratories of a representation series of cultures distributed by Prof. Baldacci; they will receive cards from Dr. Wallhäuser, Frankfurt/Maine, Germany, on which they will enter their findings for a particular strain and these will be analysed statistically to determine the status of the strain.

Pridham (T. G.), Hesseltine (C. W.), & Benedict (R. G.). **A guide for the classification of streptomycetes according to selected groups.**—*Appl. Microbiol.*, **6**, 1, pp. 52–79, 8 fig., 1958.

This is a provisional guide to 7 sections, based on morphology of sporophores, and to 6 series, based on spore colour, with a list of component spp. and strains of *Streptomyces*. Metabolic products or activity of the spp. are enumerated and documented. The guide is preceded by a general discussion.

Pridham (T. G.), Anderson (P.), Foley (C.), Lindenfelser (L. A.), Hesseltine (C. W.), & Benedict (R. G.). **A selection of media for maintenance and taxonomic study of streptomycetes.**—*Antib. Ann., 1956–1957*, pp. 947–953, 1957.

Full directions are given, from the Northern Utilization Research Branch, Agricultural Research Service, Peoria, Illinois, for the preparation of media for culturing *Streptomyces* and opt. for study of sporophore morphology, spore colour (colour of mature sporulating aerial mycelium), colour of the reverse, and colour of soluble pigment, if produced [see above]. The 10 best agar media were: tomato paste with or without oatmeal, yeast extract, Hickey and Tresner's, Bennett's, Czapek's, potato dextrose, Carvajal's oatmeal, asparagine dextrose, and inorganic salts-starch.

Eichhorn (E.). **Über Rostpilze.** [Concerning rust fungi.]—*Ber. bayer. bot. Ges.*, **32**, pp. 142–144, 1958.

In brief field notes on 12 spp. the author mentions a general outbreak of *Puccinia helianthi* [on sunflowers] in several localities in Bavaria and also in Carinthia in 1941, in both of which it had been recorded only twice previously and it was not seen again by the author in the succeeding years.

In the Otterbach valley near Regensburg in 1934 numerous 1–2 m. fir [*Abies*] trees bore aecidia of *Pucciniastrum abieti-chamaenerii* [*P. epilobii*], which caused severe damage, particularly to the leading shoots, and gave the trees a white appearance.

Вопросы почвенной микробиологии. [Questions of soil microbiology.]—Труд. Инст. Микробиол. А. Н. Латв. ССР [*Trud. Inst. Microbiol. Acad. Sci., Latv. S.S.R.*], *1958*, 7, 175 pp., 7 fig., 21 graphs, 1958. [136 ref.]

This publication contains 23 papers read at a conference on soil microbiology at Riga, Nov. 1956, many of them general papers on micro-organisms in soil.

Mme O. I. Pushkinskaya (pp. 35–42) reported on the role of fungi in the synthesis of humus. The most active are *Penicillium* spp. of the sections Monoverticillata and Asymmetrica, which possess active phenol-oxidases. The Biverticillatae oxidize only the hydroquinones and resorcins with formation of dark coloured substances. Dark coloured compounds produced by *P. roquefortii* are different from the soil humic acid.

Mme N. M. Shemakhanova (pp. 57–66), dealing with the mycotrophic nature of

trees, reported that pine seedlings and 1-yr.-old plants utilized pantothenic acid, nicotinic acid, and biotin with a 20–24% overall increase of growth. Filtrates from 17–33-day-old cultures of *Boletus bovinus*, *B. luteus*, *B. subtomentosus*, *Amanita rubescens*, *Cenococcum graniforme*, *B. granulatus* [cf. **38**, p. 395], and a culture isolated from pine mycorrhiza all increased growth from 4–25%, depending on the fungus and 3–37%, depending on the age of the culture, the older giving better results. Vitamins were detected in the filtrates; *B. luteus*, *B. bovinus*, and *C. graniforme* also formed pantothenic acid, and the 1st 2 nicotinic acid and biotin.

F. P. Vavulo (pp. 139–146), investigating the regularity of distribution of micro-organisms in the turf-marsh soils of White Russia over several years, found fungi to be less abundant than actinomycetes or bacteria; they were chiefly in the top 10 cm. Apart from the usual soil fungi (Mucorales and imperfect fungi) *Chaetomium* spp. are numerous, and at greater depths pink and white yeast-like fungi are found. The geographical position of the dried turf-marsh soils influences greatly the content of micro-organisms.

E. Y. Lauzne & V. V. Upitis (pp. 147–152) dealt with the changes in the content of the microflora in meadow soil in the Rugen, Talsi, and Rizh regions of Latvia, when the meadows are improved by application/ha. of 400 kg. superphosphate, 200–300 kg. KCl, 200 kg. ammonium sulphate, 15 tons manure, and 40 tons of compost. The fungus content at up to 20 cm. depth was increased about 30%. In meadows with higher mineral content the fungi increased when the mineral content of the fertilizers was greater. Fungus numbers were highest at the beginning and end of the growing period. *Dicoccum asperum*, *Cephalothecium roseum*, *Trichoderma*, *Alternaria*, *Penicillium*, and *Cephalosporium* spp. were found to play an important role in cellulose decomposition. Fertilizers high in K gave the greatest increase in fungi.

Saraswathi-Devi (Miss L.). **Essentiality of trace elements to some soil fungi.**—*J. Indian bot. Soc.*, **37**, 4, pp. 509–516, 1 pl., 2 graphs, 1958.

In further studies [cf. **38**, p. 63] at Madras University *Fusarium vasinfectum*, *F. moniliforme* [*Gibberella fujikuroi*], *F. udum*, *F. scirpi*, *F. orthoceras*, *F. oxysporum*, *F. lini*, *F. poae*, and *F.* sp. isolated from wilted tomato plants were grown on a basal medium (purified by Al_2O_3) adjusted to pH 5, the stock solutions being + all (containing Fe, Zn, Cu, Mn, and Mo), —Fe, and —Zn. Cu requirements were determined by growing the fungi with the standard 'M' strain of *Aspergillus niger* on basal medium (purified by H_2S co-precipitation).

Fe and Zn were essential for all the spp., but the indispensability of Cu could not be demonstrated even where *A. niger* showed typical deficiency symptoms.

Salam (M. A.) & Rao (P. N.). **Fungi from Hyderabad (Deccan)—I.**—*J. Indian bot. Soc.*, **36**, 3, pp. 421–427, 9 fig., 1957.

The 23 spp. here noted from the Dept of Botany, Osmania University, Hyderabad, include *Cercospora solani-melongenae* on eggplant leaves, *C. zinniae* on zinnia leaves, *C. arachidicola* [*Mycosphaerella arachidicola*: map 166] on groundnut, *C. ricinella* on *Ricinus communis* leaves, *C. dahliicola* Salam & Rao on dahlia leaves, with spores 46·8–126 × 2·4–4·8 μ, and *C. lycopersici* Salam & Rao on tomato leaves with spores 24–67·2 × 3·2–4·8 μ.

Guyot (A. L.). **Contribution à l'étude de la flore mycologique de la Tunisie.** [A contribution to the study of the mycological flora of Tunisia.]—*Ann. Serv. bot. Tunis.*, **28** (*1955*), pp. 69–139, 40 fig., 1958.

Descriptive and technical notes are given on 98 fungi (ascomycetes and fungi imperfecti, mostly on wild hosts), including 13 new spp., found in Tunisia [cf. **35**, p. 125].

Litzenberger (S. C.) & Stevenson (J. A.). **Una lista preliminar de enfermedades de las plantas nicaraguensis.** [A preliminary list of Nicaraguan plant diseases.] —*Ceiba*, **8**, 1, pp. 19–39, 1959.

This is a Spanish version (translated by A. C. Pelen) of a list previously published [**36**, p. 683].

Rogerson (C. T.). **Kansas mycological notes—1955–1956.**—*Trans. Kans. Acad. Sci.*, **60**, 4, pp. 370–375, 1957.

Twenty-three new records for Kansas are in this list, including *Hypoxylon mediterraneum*, associated with dying oaks (*Quercus alba*, *Q. palustris*, and *Q. imbricaria*).

Meyer (J.). **Moisissures du sol et des litières de la région de Yangambi (Congo belge).** [Moulds of the soil and of litter in the region of Yangambi (Belgian Congo)].—*Publ. Inst. nat. agron. Congo belge*, Sér. sci., **75**, 211 pp., 4 pl., 100 fig., 1959. [98 ref.] Fr. 190.

In this monograph, based on work carried out since 1952 at the Laboratoire de Microbiologie des Sols, Centre de Recherches de l'I.N.É.A.C., Yangambi, the author presents his taxonomic observations on the fungi isolated locally by him from soil and litter. All the fungi identified to genus or sp. are described, and many are figured. A total of 251 species is covered, 191 from soil (13 Mucorales, 31 Ascomycetes—not including ascogenous species of *Penicillium* and *Aspergillus*—and 147 Deuteromycetes) and 60 from litter; 77% are fungi imperfecti. *Penicillium* (17 spp.) and *Aspergillus* (21 spp.) were not studied in detail.

Talbot (P. H. B.). **Studies of some South African resupinate Hymenomycetes. Part II.**—*Bothalia*, **7**, 1, pp. 131–187, 7 pl. (38 fig.), 1958.

In these further studies [**31**, p. 460] 15 genera of the Thelephoraceae are described including *Pellicularia*, *Coniophora*, *Corticium*, *Peniophora*, and *Merulius*. Keys are given to the accepted 20 genera and to the S. African spp. Six new spp. and 1 new var. are described. Mention may be made of *Pellicularia fodinarum* Talbot on green timber in gold mines; *Coniophora arida* [**38**, p. 552] on *Pinus taeda* and *Acacia mollissima*; *C. incrustata* Talbot growing on walls of a dairy; *C. puteana*, most previous records of which are not this sp.; the conidial state of *Corticium salmonicolor* [map 122] found on *Pyrus malus* in Natal; *C. punctulatum* on underground mine timber; *Peniophora longispora* var. *brachyspora* Talbot on mine timber; *P. tenuis* on underground timber; and *Odontia bicolor* on worked pine.

Cunningham (G. H.). **Hydnaceae of New Zealand. Part I.—The pileate genera Beenakia, Dentinum, Hericium, Hydnum, Phellodon and Steccherinum.**—*Trans. roy. Soc. N.Z.*, **85**, 4, pp. 585–601, 3 pl., 6 fig., 1958.

In continuation of his studies [cf. **36**, p. 730] the author enumerates the general characteristics of the 6 gen. and the included spp. found in New Zealand, noting the general distribution elsewhere. A key to the genera is given; 3 spp. are new.

Lowe (J. L.). **The genus Poria in North America.**—*Lloydia*, **21**, 2, pp. 100–114, 1958. [37 ref.]

A key is provided for the identification of the 137 spp. known in N. America, giving the main characteristics of each, hosts, and distribution; 30 imperfectly known spp. are listed with information on type material. A specific epithet index is appended.

Reimers (H.) & Scholz (H.). **Brand- und Rostpilze aus dem Gardasee-Gebiet.** [Smut and rust fungi from the Lake Garda region.]—*Willdenowia*, **2**, 2, pp. 151–162, 1959.

An annotated list of 22 Uredinales and 2 spp. of *Urocystis* collected near Lake Garda, Italy, in May 1958.

DURAN (R. D.). **A monograph of the genus Tilletia.**—*Diss. Abstr.*, **19**, 3, pp. 419–420, 1958.

Following the examination, at the State College of Washington, of several thousand specimens representing virtually all spp. assigned to *Tilletia* since 1847, the author concludes that species delimitation on the basis of spore morphology is practicable. Spore data, recorded as numerical formulae in the manner described by Ainsworth [**21**, p. 166], were classified by means of I.B.M. punched cards. Great interspecific as well as intraspecific variation in the genus became apparent, and it is held that this necessitates broader, more practical, limits for species delimitation than those hitherto proposed. The 61 spp. recognized [but not named herein] include several composite ones.

RICHARDS (O. W.). **Some recent advances in microscopy. III. Photomicrography.**—*J. biol. photogr. Ass.*, **26**, 1, pp. 23–28, 1958. [*Biol. Abstr.*, **33**, 5, p. 1309, 1959.]

Over 80 papers are reviewed under: general, apparatus, methods, applications, illumination and exposure, stereophotomicrography, and cinephotomicrography.

KOOPMANS (M. J.). **A microdispersing apparatus for the use of biological investigation of chemicals.**—*Meded. LandbHogesch. Gent.*, **23**, 3–4, pp. 831–836, 3 fig., 1958. [French summary.]

This apparatus, developed at the Philips-Roxane Laboratory, S'Graveland, Netherlands, consists of a set of conical glass containers, each with a close-fitting rotating grinder, in which 10–50 mg. samples of the chemical under study are ground for 15 min. at 200 r.p.m. with 0·1–0·5 ml. of a 1% aqueous sol. of a dispersant, such as emulphor, triton X-100, or sulphite lye; the procedure usually suffices to reduce particle size to 10 μ or less.

KRAMER (C. L.) & MIX (A. J.). **Deep freeze storage of fungus cultures.**—*Trans. Kans. Acad. Sci.*, **60**, 1, pp. 58–64, 1957.

At the University of Kansas, Lawrence, 331 of 451 cultures of fungi, actinomycetes, and bacteria stored in a deep-freeze cabinet at —18° C. survived for a period of 5 yr.; a further 65 survived 2 separate periods each of 2 yr., and 55 (of all groups) failed repeatedly to survive for 1 yr.

MARAMOROSCH (K.). **New techniques, submerged plant and insect cell culture, and their application to leafhopper-borne viruses.**—Fifteenth International Congress of Zoology, 1958, Sect. VIII, Paper 35, 3 pp., [1958].

The author reviews the achievements in insect tissue culture that might be useful in studying viruses which multiply in animal tissues, such as aster yellows virus in the aster leaf-hopper (*Macrosteles fascifrons*) [**36**, p. 172]. Using the methods of Steward and of Nickell for developing clones of plant material as dispersed single cells in continuous submerged culture, the author in collaboration with Nickell maintained maize stunt virus [cf. **35**, p. 602] for 4 months in maize leaf cells. [These results receive brief mention in *Anat. Rec.*, **131**, 3, p. 579, 1958.]

MIYAMOTO (Y.). **The nature of soil transmission in soil-borne plant viruses.**—*Virology*, **7**, 2, pp. 250–251, 1959.

At the Dept of Plant Pathology, Hyogo University of Agriculture, Japan, a small number of [wheat and barley] plants became infected when grown in 2 types of clean soil in which ground tissues of plants infected by wheat yellow mosaic virus [soil-borne wheat mosaic virus (str.)] or barley yellow mosaic virus [cf. **38**, p. 139] had been buried 2 yr. previously. The infectivity of pelleted soil particle fractions from such soil was examined by sowing seeds in them or by rubbing seedlings with them. The clay fraction (particles of diam. $< 2\,\mu$) was much more infectious than

the coarser fractions, which did, however, include some clay particles. There were within the clay pellets no special micro-organisms regarded as possible vectors. A few plants were infected by rubbing with mud made from the clay fraction: these findings are in keeping with the author's view that these viruses are adsorbed by soil particles of the clay fraction.

YARWOOD (C. E.). **Virus infection and heating reduce smog damage.**—*Plant Dis. Reptr*, **43**, 2, pp. 129–130, 1 fig., 1959.

It was observed at the University of California, Berkeley, that a zone of tissue (1·9 mm. diam.) round the lesions caused by tobacco mosaic virus on pinto bean [*Phaseolus vulgaris*] leaves remained uninjured by smog [**36**, p. 48] which severely damaged the rest of the leaf. The pattern resembled that of similar protection from smog injury noted round lesions caused by *Uromyces phaseoli* [*U. appendiculatus*] (*Plant Physiol.*, **29**, pp. 393–395, 1954.) Also, leaves dipped in water for 5–20 sec. at 50–55° C. suffered either no smog damage or less than untreated leaves.

SHALLA (T. A.). **Relations of Tobacco mosaic virus and Barley stripe mosaic virus to their host cells as revealed by ultrathin tissue-sectioning for the electron microscope.**—*Virology*, **7**, 2, pp. 193–219, 34 fig., 2 graphs, 1959.

When over 1,000 ultra-thin sections of epidermal, mesophyll, and hair cells of tobacco and tomato systemically infected by tobacco mosaic virus (TMV) were examined by electron microscopy at the Dept of Plant Pathology, University of California, Davis, rod-shaped particles were seen only in cells containing crystalline inclusion bodies. Characteristic particles were not to be found in sections of cells adjacent to necrotic lesions in *Nicotiana glutinosa* and *Datura stramonium*, though these cells were demonstrably engaged in virus synthesis.

These results suggest that the biologically active, replicating form of TMV in the cell is smaller than the typical 300 mμ-long rod found in expressed sap and intracellular virus crystals (cf. Steere, *J. Biophys. Biochem. Cytol.*, **3**, pp. 45–60, 1957). By contrast, rod-shaped particles were readily demonstrated in the cytoplasm of mesophyll and epidermal cells of barley infected by barley stripe mosaic virus. Plasmodesmata in tobacco leaves are often of sufficient size to allow the passage of intact TMV rods.

HOLLINGS (M.). **Host range studies with fifty-two plant viruses.**—*Ann. appl. Biol.*, **47**, 1, pp. 98–108, 2 pl., 1959.

The author describes the reactions of 15 plant spp. in families related to the Caryophyllaceae (Hutchinson's classification) when mechanically inoculated at the Plant Pathology Laboratory, Harpenden, with 68 isolates of 52 plant viruses. No general relationship was established between susceptibility to particular viruses and taxonomic relationships of the hosts, some of which were susceptible to many more viruses than others. *Chenopodium amaranticolor*, *Gomphrena globosa*, and *Tetragonia expansa* were hosts for many of the viruses and make suitable standard test plants. *Amaranthus caudatus*, *Celosia argentea*, beet, and spinach were of limited use in diagnostic or quantitative work. *Dianthus barbatus* and *Primula malacoides* were convenient plants for maintaining stock cultures of some viruses. All 15 spp. contained inhibitors, none of which prevented any of the viruses from infecting the 15 indicator plants, though several spp. contained inhibitors preventing infection of tobacco, *Nicotiana glutinosa*, *Phaseolus vulgaris*, and cowpea. In some hosts systemic invasion depended on several apparently independent factors, such as temp., virus conc., virus strain, and type of local lesion.

In many instances, strains of 1 virus had different host ranges or caused different kinds of symptoms, while similar symptoms were sometimes set up by different viruses. Some viruses causing similar symptoms on different test plants also shared

other properties; lettuce mosaic and pea mosaic viruses, for example, induced similar and characteristic reactions in *Chenopodium*, *Gomphrena*, *Amaranthus*, and *Primula*; both possessed similar *in vitro* properties; both were aphid-transmitted in the non-persistent manner; and both were sometimes seed-borne. Both infected pea and sweet pea, and neither infected *Phaseolus vulgaris*.

Host-range studies, it is concluded, can be used to separate similar viruses or virus strains and can suggest similarities between viruses, but are unlikely to form a useful basis for a natural classification of viruses.

Schwarz (R.). **Stellaria media Vill. als Wirt für zwei weitere Virosen.** [*S. media* as a host for 2 further viruses.]—*Z. PflKrankh.*, **66**, 2, pp. 86–89, 1 fig., 1959. [English summary.]

At the Institut für gärtnerische Virusforschung, Berlin-Dahlem, a virus from *S. media*, sap-transmitted to *Chenopodium quinoa*, could not be identified with any virus previously described and is therefore designated '*Stellaria*-Bandblättrigkeit' (*S.* ribbon leaf) virus.

Tobacco vein-browning virus [**36**, p. 503], reported to be limited to Solanaceae, was transmitted from tobacco to *S. media* by sap and *Myzus persicae*. Only a small proportion of inoculated plants was infected and the virus was so changed by passage through the host that symptoms resembling ring spot appeared initially on re-inoculation to tobacco.

Hagedorn (D. J.), Bos (L.), & Van der Want (J. P. H.). **The Red Clover vein-mosaic virus in the Netherlands.**—*Tijdschr. PlZiekt.*, **65**, pp. 13–23, 4 pl., 1 graph, 1959. [Dutch summary.]

The occurrence of red clover vein mosaic virus on pea and red and white clover in the Netherlands [**37**, p. 748] is confirmed from studies on its host range, var. reaction, symptomatology, and physical properties. Among the plants inoculated, *Crotalaria spectabilis*, sweet pea, and *Ornithopus sativus* are recorded as new hosts. In electron microscope preparations the characteristic particles were found to be thin, rigid, fragile rods of length 600–700 mμ. The Dutch isolate and one of the same virus from Wisconsin gave identical positive reactions with antiserum prepared against the Dutch strain, and Wetter, at the Institut für Serologie, Brunswick, obtained a positive reaction between the Dutch antiserum and the German pea stunt virus [cf. **38**, p. 173].

Rochow (W. F.). **Chenopodium hybridum as a local-lesion assay host for Brome mosaic virus.**—*Phytopathology*, **49**, 3, pp. 126–130, 1 fig., 1 graph, 1959.

At Cornell University, Ithaca, New York, brome mosaic virus [cf. **37**, p. 711] induced discrete necrotic lesions on *C. hybridum*, germination of seed of which was increased from the usual 1% or less to about 10% by immersion in conc. H_2SO_4 for 3–5 min. and leaching for 1 week under dripping tap water. The best results were obtained by brushing inoculum onto carborundum-dusted leaves, using neutral 0·1 *M* phosphate buffer as a diluent; partially purified virus was best stored at 3° C. in 0·1 *M* acetate buffer, pH 5·1. Lesion numbers were inversely proportional to the dilution of the inocula.

Hermansen (J. E.). **Urediospore germ tube fusion between the varieties avenae and phlei-pratensis of Puccinia graminis. Split pycnial lesions of Puccinia graminis. (A study of spreading pycniospores including spores from pycnia of different color.) Relationship between age of aeciospores of Puccinia graminis and their ability to infect cereals.**—*Friesia*, **6** (*1957–58*), 1–2, pp. 30–32, 1 fig.; pp. 33–36, 1 fig.; pp. 37–39, 1959.

At the Dept of Plant Pathology and Botany, University of Minnesota, uredospores

of *P. graminis* var. [f. sp.] *avenae* germinated and the germ tubes fused among themselves on 4 media (Rodenhiser & Hurd-Karrer [**27**, p. 127] and 1% agar+ 1, 3·75, or 15% sucrose), but f.sp. *phlei-pratensis* did so only on the 1 and 3·75% sucrose agar [cf. **37**, p. 767]. Frequent hyphal fusions between the 2 vars. occurred on slides covered with a thin layer of 1 or 3·75% sucrose agar and on leaves of *Lamarckia aurea*.

The results so far obtained from splitting 91 pycnial lesions on barberry (*Berberis vulgaris*) into halves and then treating each part with exudate from 2 different pycnia support the classical theory of 2 sex groups. Some of the pycnia were white; these treated with white exudate gave rise to white aecia, whereas white plus orange exudate gave orange aecia. Inoculation to cereals established that *P.g.* f.sp. *secalis* and f.sp. *tritici* (race 198) were isolated from white pycnia; both had grey-brown uredospores.

The results of 136 inoculations with aecidiospores of various ages showed that chances of infection are considerably increased if the spores are from newly formed aecial horns, ability to infect decreasing with age; those from horns older than 1½ months were non-infective.

Moorhead (Ellen L.). **Serological studies of viruses infecting the cereal crops. II. The antigenic characteristic of Wheat streak mosaic virus as determined by the complement fixation technique.**—*Phytopathology*, **49**, 3, pp. 151–157, 1959.

In further studies in Nebraska [cf. **36**, p. 313; **38**, p. 76] rabbits were successfully immunized with several partially purified preparations of wheat streak mosaic virus. Infections in alternate weeks reduced toxicity to the rabbits, and 3 consecutive infections gave an immune serum of adequate titre. The available virus being so little, antigens were given with a mineral oil adjustment. A component of wheat remained in the antigens through several centrifugation procedures and electrophoresis; with healthy wheat sap as antigen, antibodies specific for this component could not be detected by the compliment fixation technique or were present only in small amounts, but when this sap was subjected to high speed or rate density-gradient centrifugation the non-virus antibodies were detectable in significant amounts. As the proportion of the wheat component to virus in purified antigen preparations is high, its presence must be taken into consideration in the evaluation of cross-reaction data.

Gokhale (V. P.), Patil (B. P.), & Desai (M. K.). **Discovery of virulent isolates of race 42 B of Puccinia graminis tritici in Bombay State.**—*Curr. Sci.*, **28**, 2, pp. 81–82, 1959.

During an epidemic of *P. g. tritici* in Bombay State in 1956–7, the exotic wheat var. E-572 (Ridley) and selection 146 (Gaza×Local Baxi 23) were found to be susceptible under field conditions, though both were known to be resistant to the common Indian races. The isolate from E-572, designated 42 B-1, and that from sel. 146 (42 B-2) were shown by the seedling reaction of 10 differential vars. to be distinct races, differing from each other and from the less virulent original culture of 42 B [**26**, p. 293], whereas 42 B-3, from a local var. from Kurkutte, was merely a virulent isolate or biotype of 42 B, and not a separate race.

Farkas (G. L.) & Ledingham (G. A.). **Studies on the polyphenol-polyphenoloxidase system of Wheat stem rust uredospores.**—*Canad. J. Microbiol.*, **5**, 1, pp. 37–46, 7 graphs, 1959. [22 ref.]

In studies at the Prairie Regional Laboratory, Saskatoon, Saskatchewan, polyphenol oxidase [cf. **37**, p. 451] was demonstrated in the uredospores of wheat stem rust [*Puccinia graminis*] and was released, together with phenolic substances, by the germinating uredospores, resulting in the presence of phenol oxidation products

in the surrounding medium. Of the several substrates tested, gallic acid was most readily oxidized, while pyrogallic acid and catechol were rather less so. The toxicity of the phenol oxidation products to germinating spores was greatest after short-term oxidation, was lost after long-term oxidation, but returned after very long-term oxidation. The retention of phenolics in a reduced state before they are secreted during germination or in the infection process is probably due to a quinone reductase, contained in the spores. The possible role of the phenol-phenoloxidase-quinone reductase system in host-parasite relations is discussed.

Pon (D. S.), Schmitt (C. G.), & Kingsolver (C. H.). **An Acremonium associated with stem rust pustules.**—*Plant Dis. Reptr*, **43**, 2, pp. 173–174, 2 fig., 1959.

In a field at Frederick, Maryland, *A. aranearum* [cf. Petch, **11**, p. 640] was isolated from rust pustules of race 56 of *Puccinia graminis* after a long wet period. Actual parasitism of the rust was not demonstrated.

Hassebrauk (K.). **Zur physiologischen Spezialisierung des Weizenbraunrostes (Puccinia recondita Rob. = P. triticina Erikss.) in Deutschland und anderen europäischen Staaten im Jahre 1957. Kritische Bemerkungen zur Methodik der Rassenbestimmungen.** [Physiological specialization of Wheat brown rust (*P. recondita* = *P. triticina*) in Germany and other European countries in 1957. Critical comments on methods of race determinations.]—*NachrBl. dtsch. PflSchDienst* (*Braunschweig*), *Stuttgart*, **11**, 3, pp. 43–45, 1959.

The 238 samples of *P. triticina* examined at the Institut für Botanik der Biologischen Bundesanstalt, Brunswick, in 1957 [**37**, p. 346] were derived from 126 localities in Germany, 6 in Holland, 2 in France, and 1 each in England, Denmark, Sweden, and Finland. Races 1, 17, 20, 49, 52, 53, 77, 93, 128, 155, and 165 were present, several being isolated as 2 distinct biotypes. Race 17 again predominated, followed by race 52, which appears to have become still more prevalent; 1, 20, 155, and 165 showed some increase over 1956. Race 77 was isolated for the 1st time in Germany after a protracted disappearance.

Races were more numerous in localities where a larger number of vars. was cultivated. Comparative tests on the differential vars. maintained locally for several years and on plants from seed newly obtained from Beltsville [Maryland] revealed a number of differences. An international comparison based on the above findings, therefore, can only be made with some reserve.

Andreev (L. N.). Дыхание Пшенично-пырейных гибридов, пораженных ржавчиной. [Respiration of Wheat-grass hybrids infected by rust.]—Бюл. главн. бот. Сада [*Bull. centr. bot. Gdn., Moscow*], *1958*, 31, pp. 80–85, 1958.

Experiments at the Central Botanical Gardens, Academy of Sciences, U.S.S.R., in 1955–6 showed that the intensity of respiration of wheat plants infected by *Puccinia triticina* and *P. glumarum* [cf. **37**, p. 713] was higher than in healthy ones. Max. intensity (200%) was obtained with wheat-grass hybrid no. 186 with the highest degree of *P. glumarum* infection, and min. (106%) in the same hybrid infected by *P. triticina*. Vars. resistant to *P. triticina* were not resistant to *P. glumarum*, and *vice versa*.

Miller (J. D.) & Christensen (J. J.). **Occurrence of stripe rust in Minnesota in 1958.**

Pady (S. M.) & Johnston (C. O.). **Stripe rust in Kansas in 1958.**

Bridgmon (G. H.) & Kolp (B. J.). **Stripe rust in Wyoming in 1958.**

Futrell (M. C.), Lahr (K. A.), Porter (K. B.), & Atkins (I. M.). **Second stripe rust epiphytotic in Texas hits Wheat crops in 1958.**

Hennen (J. F.) & Komanetsky (M.). **Stripe rust in South Dakota in 1958.**

Gough (F. J.), Williams (N. D.), & Brentzel (W. E.). **Occurrence of stripe rust in North Dakota in 1958.**

Rosen (H. R.), Whitehead (M. D.), Browning (J. A.), Weihing (J. L.), Green (G. J.), & Fischer (G. W.). **Short notes concerning stripe rust in other States.** —*Plant Dis. Reptr*, **43**, 2, pp. 159–172, 2 fig., 2 maps, 1959.

Stripe rust (*Puccinia glumarum*) [**37**, p. 469; map 97] was observed for the 1st time in Minnesota, and for the 2nd yr. on record in Kansas [loc. cit.]; it became quite widespread in both States. In Kansas fields of susceptible vars. had 50–80% infection and the overall loss was estimated at 1%. The concomitant scarcity of leaf rust [*P. triticina*] in Kansas was noteworthy. *P. glumarum* was especially abundant in S.E. Wyoming, particularly at higher altitudes. Another epiphytotic in Texas [loc. cit.] may have been related to the observed continued activity of the rust in some areas even after temps. increased in late spring, possibly due to the evolution of a new race. *P. glumarum*, first reported on wheat in S. Dakota in 1957, was widespread there and was observed for the first time in N. Dakota. The absence of the rust in 1958 is noted in Arkansas, Missouri, and Manitoba, and its occurrence in Iowa was not observed. Traces only were found in Nebraska and Washington.

Doling (D. A.) & Hepple (Shirley). **'Karathane' : the value of its differential fungicidal effect in relation to mildew and yellow rust of Wheat.**—*Nature, Lond.*, **183**, 4661, p. 622, 1959.

At the National Institute of Agricultural Botany, Cambridge, karathane (as a fumigant or wettable powder) was effective against *Erysiphe graminis* [cf. **36**, p. 236] on glasshouse wheat seedlings used for experimental work on *Puccinia glumarum* [cf. **37**, p. 653] but had no effect on the rust. The mildew patches were thinner, though more widespread, but there was no subsequent 'flush' which typically follows 4–5 days after initial infection. Karathane fumigation of rust-resistant and rust-susceptible seedlings 1–10 days before and 2–10 days after infection with uredospores produced the anticipated reaction, and uredospores removed from these plants 20 hr. after fumigation produced successful secondary infections. Thus successful control of mildew was obtained for at least 8 weeks by immediate fumigation with karathane following every appearance of mildew pustules (every 10–12 days under experimental conditions) without affecting yellow rust.

Forsyth (F. R.) & Peturson (B.). **Chemical control of cereal rusts. IV. The influence of nickel compounds on Wheat, Oat, and Sunflower rusts in the greenhouse.**—*Phytopathology*, **49**, 1, pp. 1–3, 1959.

In further studies at Winnipeg, Manitoba [cf. **38**, p. 316], protectant sprays of Ni compounds were applied before inoculation with leaf rust (*Puccinia rubigo-vera* [*P. triticina*]) and stem rust (*P. graminis*) on Marquis and Little Club wheat, against crown rust (*P. coronata*) on Ukraine oats, both at the 1st seedling leaf stage, and against *P. helianthi* on S_{37} hybrid sunflower when the 1st two true leaves unfolded; infection was rated 10 days later. Eradicant sprays were applied to the inoculated leaves 1 day after the 1st visible sign of infection (generally on the 6th day) or alternatively 2 or 5 days later. When the Ni salt amine complex RH-1 [loc. cit.] was applied at 280 p.p.m. Ni and other Ni salts at 70 p.p.m. their effectiveness as eradicants of the wheat rusts was RH-1 = nitrate = chloride > sulfate = fluoride = acetate; as protectants all were effective sources of Ni against stem rust and all but the fluoride against leaf rust. RH-1 was less easily removed by simulated rainfall than the water-soluble salts. Eradicant sprays acted better if applied after the epidermis had been broken by developing uredia, but were useless after

the pustule had been sporulating for 2 days. Addition of ammonium hydroxide at 444 or 1,333 p.p.m. NH_3 to nickel chloride rendered it ineffective in these trials, in contrast to the findings of other investigators [cf. **16**, p. 49], for reasons not clearly understood.

Oat and sunflower seedlings were more sensitive to the toxicity of Ni salts than wheat and would tolerate only the lower concs. needed for protective action.

Popp (W.). **A new approach to the embryo test for predicting loose smut of Wheat in adult plants.**—*Phytopathology*, **49**, 2, pp. 75–77, 4 fig., 1959.

At the Canada Dept Agric., Winnipeg, Manitoba, application of a recent method [**38**, p. 318] for detecting *Ustilago tritici* [*U. nuda*] in wheat embryos [cf. **37**, p. 653] indicated 3 types of reaction: resistance of the whole embryo, susceptibility of all embryo tissue except the plumule bud, and susceptibility involving the plumule bud also. Only the last is correlated with infection in growing plants and its estimation was found to give a reliable prediction of the amount of infection to be expected in the ensuing crop.

Geshele (É. É.). О характере специализации **Ustilago tritici (Pers.) Jens.** [On the character of specialization in *U. tritici*.]—Тр. Ста Защ. Раст. Казахск. Фил. ВАСХНИЛ [*Trud. Sta. Zashch. Rast. Kazakh. fil. VASKNIL*], **3**, pp. 169–170, 1956. [Received Apr. 1959.]

In N. Caucasus and W. Siberia loose smut (*U. tritici*) [*U. nuda*: **37**, p. 331; **38**, p. 194] attacks mainly soft wheat. Hard wheat is much more resistant even when inoculated but can be heavily infected in some years. After several generations on hard wheat it is more pathogenic to hard than to soft wheat. Crops of hard wheat with more than 0·5% infection should be destroyed in order to avoid the appearance of the new virulent form.

Niemann (E.). **Weitere Untersuchungen zur Kaltbehandlung von Gerste und Weizen gegen Flugbrand.** [Further studies on the cold treatment of Barley and Wheat against loose smut.]—*NachrBl. dtsch. PflSchDienst (Braunschweig), Stuttgart*, **10**, 10, pp. 145–151, 1 fig., 8 graphs, 1958. [English summary.]

The injury to wheat and barley during the cold water soaking treatment against *Ustilago nuda* [**38**, p. 318] is caused by the multiplication of anaerobic microorganisms in the water and was avoided by surface sterilization of the grain (with bromine water in these experiments at the Institut für Getreide-, Ölfrucht- und Futterpflanzenkrankheiten, Kiel-Kitzeberg, Germany) and changing the water. With barley (1 winter and 2 spring vars.) anaerobic wetting was effective at temps. as low as 8·3° C. and with only 10% added water, provided that the duration of treatment was sufficiently long (up to 800 hr.). Increasing the temp. or the amount of water reduced the time required, and satisfactory results were obtained with wheat (2 spring vars.) and barley at 20·5°, with 16% added water, over the range 120–320 hr. [**36**, p. 756]; only wheat showed a reduction in germination, which was not as great as for cold water soaking. The effectiveness of anaerobic wetting was found to run parallel with the build up of air pressure in the closed storage cylinder, regardless of temp. or var. Thus, for a given level of added water the pressure reached may be used to determine when the disinfection process is complete.

Kendrick (E. L.) & Purdy (L. H.). **A seedling reaction of Wheat indicative of bunt infection.**—*Phytopathology*, **49**, 3, pp. 130–132, 1 fig., 1959.

At Washington Agricultural Experiment Station, Pullman, greenhouse-grown Red Bobs wheat, seed-inoculated with races of *Tilletia caries* and *T. foetida* [**38**, p. 403], representing all important pathogenic types, always developed a characteristic

chlorotic flecking of the leaves, easily detectable at the 3- or 4-leaf stage and persisting to maturity; partial infection resulted in unilateral flecking, on 1 side of the midrib. Other susceptible vars. reacted similarly, while no flecking appeared on those known to be highly resistant [cf. **18**, p. 664]. The use of this method and the growth of wheat under artificial light in the winter would greatly facilitate studies of bunt resistance, especially in winter wheats.

Štota (Z.) & Toman (M.). **Účinnost některých hexasubstituovaných derivátů benzenu proti Tilletia foetida (Wallr.) Liro.** [The effect of some hexa-substitute derivatives of benzene on *T. foetida*.]—*Biologia, Bratislava*, **13**, 2, pp. 124–128, 1958. [Russian and German summaries. Abs. in *Referat. Zh. Biol., 1959*, 4, p. 200, 1959.]

Of the 11 derivatives tested, hexachlorobenzene (HCB) [**37**, p. 404] and pentachloronitrobenzene (PCNB) proved the most efficient for treatment of cereal grain against *T. foetida* [**37**, p. 582]. The replacement of Cl atoms in HCB with some other substituents in the first order or of 2 Cl atoms in the nitro-group leads to a decrease of efficiency. In tests with the same compounds as soil fungicides against *Rhizoctonia* [*Corticium*] *solani* parachloronitrobenzene and trichloro-*m*-dinitrobenzene were the most effective.

Zaleski (K.), Grela (T.), & Horówna (Władysława). **Dwuletnie doświadczenia porównawcze kilkoma nowymi zaprawami na zwalczanie śnieci Pszenicznej (Tilletia tritici) w latach 1948/49 i 1949/50.** [Comparative experiments with several new compounds for the control of Wheat smut (*T. caries*) in the years 1948–9 and 1949–50.]—*Prace Kom. Nauk. roln. lésn. Poznań*, **3**, 7, p. 18, 1957. [Russian and English summaries. Abs. in *Referat. Zh. Biol., 1959*, 7, p. 203, 1959.]

Following various treatments to winter wheat seed infected by spores of *T. caries*, healthy, partially infected, and infected ears were counted on test plots [in Poland]. Good control was given by dusting with ceresan 0·2:100, soaking for 15 min. in 1% Bordeaux, and soaking for 5 min. in 1% $CuSO_4$ followed by 10 min. in 2% milk of lime. Spergon and yellow cuprocide were not superior to ceresan.

Кеснек (N. A.). Новые протравители семян против твердой головни Пшеницы. [New compounds for seed treatment against dwarf bunt of Wheat.]—Бюл. Науч. тех. информ. Арм.н. и.Ин-та-Земледел. [*Bull. nauch.-tekh. inform. Arm. n.-i. Inst. Zemled.*], *1957*, 3, pp. 32–35, 1957. [Abs. in *Referat. Zh. Biol., 1959*, 7, p. 203, 1959.]

Thiram and BHC proved very effective against dwarf bunt [*Tilletia contraversa*: **37**, p. 765] in tests during 1953–55 in the Kirovakan Selection district and Nova Avkhta, Armenia, U.S.S.R.

Meiners (J. P.). **Methods of infecting Wheat with the dwarf bunt fungus.**—*Phytopathology*, **49**, 1, pp. 4–8, 1959.

Various methods of inoculating wheat with *Tilletia contraversa* [cf. **35**, p. 436], used in intermittent studies at the Washington Agricultural Experiment Station, Pullman, during 1954–57 are described. The most effective involved either the application of agar containing germinating spores to wheat seed, which was then germinated in moist vermiculite, or (when sufficient inoculum was available) spraying a heavy spore suspension in late Sept. or early Oct. on soil in which wheat seed had been sown at a depth of ½–1 in. [cf. **36**, p. 93 and below]. Modifications of the 1st included the substitution of moist filter paper for vermiculite and inversion of spore bearing agar over the germinating seed, or germination of the seed in agar containing the spores, adjustment enabling the coleoptiles to grow along the surface of the medium. Inoculation of seedlings under partial vacuum [cf. **33**, p. 420]

also proved successful, and some infection was obtained by spraying germinating seedlings (coleoptiles 2–4 mm.) with spore suspensions. Results varied also with the var. used; opt. temp. differed considerably, especially from year to year.

Tyler (L. J.). **Protracted period of vulnerability of winter Wheat to attack by Tilletia contraversa.**—*Plant Dis. Reptr*, **42**, 12, pp. 1387–1390, 1 fig., 1958.

At Cornell University, Ithaca, New York, seedlings of Cornell 595 winter wheat transplanted to a field nursery and soil-inoculated with *T. contraversa* when 20, 31, 38, 45, and 52 days old, then wintered under straw [**38**, p. 199], developed 88·4, 85·7, 91·3, 86·3, and 26·6% infection, respectively, the corresponding percentages of infected tillers being 86·9, 89·3, 67·8, 62·5, and 41·1. Since the plants remain vulnerable for almost 2 months the straw cover method of incubation is probably effective simply through maintaining an environment favourable to the pathogen.

Takegami (S.). **Analysis of injuries to Wheat spikes infected by Gibberella zeae (Schw.) Petch.**—*Proc. Crop Sci. Soc. Japan*, **27**, 2, pp. 235–237, 4 fig., 1958. [Japanese. Abs. from English summary.]

Wheat spikes infected by *G. zeae* (head blight) [**37**, p. 155], but with a healthy culm, when inserted in 0·5–1% eosin at the Faculty of Agriculture, Okayama University, Japan, absorbed the solution up to a point just below the infected spikelets. By this means, the water flow in the vascular bundles of the rachis was seen to have stopped at the point of infection. Thus, injuries to spikelets (or grains) could be classified as either due to direct infection or withered because the infected rachis had lost the capacity for conducting water and nutrients. Downward growth of the fungus in the rachis was more rapid in the resistant Shinchunaga than in susceptible Saitama No. 27. The sooner *G. zeae* causes the rachis to wither the more rapidly will the spikelets (or grain) follow suit. In such vars. as Shinchunaga where the rachis withers soon after infection, penetration of the surrounding spikelets is arrested by lack of moisture in the spike, since *G. zeae* requires high moisture for infection and growth. In vars. such as Saitama No. 27, however, with a rachis which withers rather slowly, the disease spreads from the infected segment and causes severe damage.

Butler (F. C.). **Saprophytic behaviour of some cereal root-rot fungi. IV. Saprophytic survival in soils of high and low fertility.**—*Ann. appl. Biol.*, **47**, 1, pp. 28–36, 1 diag., 1959.

Experiments were made at the Agricultural Research Institute, Wagga Wagga, New South Wales, to determine why the resumption of ley land for wheat growing should be accompanied by an increase in take-all (*Ophiobolus graminis*) [cf. **33**, p. 147] and root rot due to *Fusarium culmorum*, but not in the foot and root rots due to *Helminthosporium sativum* [*Cochliobolus sativus*] and *Curvularia ramosa* [loc. cit.]. It was shown that these differences were related to the relative capacity of the causal fungi to persist in wheat straw buried in jars in each of 2 unsterilized soils, 1 from an area sown 6 yr. before with subterranean clover, while on the other a cereal crop–natural pasture rotation, with no deliberate inclusion of legumes, had persisted for 50 yr.; organic C and total N were 0·93 and 0·13%, respectively, in the ley soil and 0·65 and 0·07% in the cultivated soil. The saprophytic survival of *O. graminis* and *F. culmorum* was favoured and that of *Cochliobolus sativus* markedly depressed by high soil fertility, that of *Curvularia ramosa* being little affected. The last 3 remained viable under soil conditions best suited to their survival in $\frac{1}{3}$–$\frac{1}{2}$ of the test straws for 2 yr., but *O. graminis* was not recovered after 1 yr. Studies of field survival are in progress, but it appears that ley fallow periods should either be not less than 10 months or a take-all resistant crop such as oats or linseed should be included in the rotation.

Dragicevic (M. C.) & Gottlieb (D.). **Determinación del causante de la enfermedad del 'mal del pie' en Trigo.** [Determination of the cause of the foot-rot disease of Wheat.]—*Agricultura téc., Santiago*, **17**, 2, pp. 80–85, 1957. [English summary. Received 1959.]

In this study of wheat take-all (*Ophiobolus graminis*) in Chile [**37**, p. 276] at the Departamento de Producción Agraria, Santiago, 112 fungal colonies isolated from diseased tissue in 1956 were examined: 56·4% (63 colonies) were not pathogenic to Nord Deprez, 21·4% (24) were highly pathogenic (usually rated 5 = fully diseased, rarely rated 4) and corresponded to *O. graminis*, 16% were slightly pathogenic (ratings ranging from trace to 2) and corresponded to *Fusarium* spp., and 6·2% (other fungi, to be determined) were slightly pathogenic.

Zogg (H.). **Fruchtwechsel und biologische Bodenentseuchung.** [Crop rotation and biological soil sterilization.]—*Pflanzenarzt*, **12**, 2, pp. 17–20, 2 fig., 1 diag., 3 graphs, 1959.

A general appraisal of the subject from the Eidg. landwirtschaftliche Versuchsanstalt Zürich-Oerlikon, Switzerland, especially in relation to cereal crops and various foot-rots (including *Cercosporella herpotrichoides* and *Ophiobolus graminis*) [cf. **38**, p. 194]. Possible crop rotations are indicated.

Golubintseva (Mme A. P.). Корневая гниль ветвистой Пшеницы. [Root rot of ramose Wheat.]—*Bull. Tomsk Univ.*, **141**, pp. 96–102, 1957. [Abs. in *Referat. Zh. Biol., 1958*, 20, p. 198, 1958.]

An investigation in the Novosibirsk region, U.S.S.R., into the causes of root rot in wheat (*Helminthosporium*, *Fusarium*, and *Alternaria* spp.) [**37**, p. 24] indicated that stubble wheat and grasses are the main sources of infection, followed by seed infection. Autumn heat treatment in the open air, treatment of the grain with granosan, and application of fertilizers are recommended.

Smalii (V. T.). Утворення вітамінів бактеріями ризосфери Пшениці. [The formation of vitamins by the bacteria in the Wheat rhizosphere.]—*J. Microbiol., Kiev*, **21**, 1, pp. 25–31, 1959. [Russian summary.]

In laboratory tests at the Institute of Microbiology, Kiev, the formation of active substances, such as vitamins B_1 and B_{12}, nicotinic and pantothenic acids, by bacteria isolated from the wheat rhizosphere was established. The highest concentrations were in cultures of *Pseudomonas sinuosa*, *P. radiobacter*, and *P. aurantica*. Some vitamins appeared in day-old or 5-day old cultures, others (B_1 and B_{12}) in 10-day-old.

Glass (R. L.) & Geddes (W. F.). **Grain storage studies. XXVII. The inorganic phosphorus content of deteriorating Wheat.**—*Cereal Chem.*, **36**, 2, pp. 186–190, 1959.

At Minnesota Agricultural Experiment Station the inorganic P content of a sample of Ceres wheat stored at approx. 18% moisture for 26 weeks at 30° C. increased from an initial value of 0·021% to 0·067 under N and to 0·059% under air. The changes did not appear to be attributable to the activity of *Aspergillus restrictus* and *A. flavus* [**37**, p. 471], being rather greater, in fact, in the mould-free than in the contaminated samples, and are provisionally referred to the operation of wheat phytase on phytic acid.

Chatterjee (P.). **Nature of resistance to penetration and infection of Ustilago hordei (Pers.) Lagerh. in seedlings of four hull-less spring Barley varieties.**—*Diss. Abstr.*, **19**, 3, p. 418, 1958.

At Michigan State University spore germination and penetration of race 6 of *U.*

hordei and of an Alaskan isolate were similar on 2 resistant and 2 susceptible barley vars. In the former a sheath formed in the epidermal cells round the penetrating hyphae, preventing further access. Collapsed zones, frequently observed in the coleoptiles, increased in size with the amount of inoculum on the surface. Sometimes hyphal growth was retarded in the absence of visible changes in the cytoplasm of the host cell, the diam. of the hypha decreasing before growth finally ceased. In all vars. there was a highly specific reaction to artificial wounding: no sheath formed, and suberin was demonstrable by a micro-chemical test in the dark-stained area of the wound. Of 10 amino acids examined, 4 assisted the establishment of the fungus in resistant host tissue, but they did not change the host/pathogen relationship of susceptible vars.

Nelson (R. R.). **A major gene locus for compatibility in Trichometasphaeria turcica.**—*Phytopathology*, **48**, 3, pp. 159–160, 1959.

From N. Carolina State College, Raleigh, a technique is described for ready production of perithecia of *T. turcica* [**37**, p. 650], the perfect state of *Helminthosporium turcicum*. Agar blocks of isolates to be mated were placed on opposite sides of barley grains, oven-sterilized for some 2 hr. at 180° F. and partially embedded in Sach's agar+20 g. dextrose and 10 g. cellulose gum/l., and incubated at 75°. Perithecia formed in 6–7 days and mature ascospores in about 20. Sterilizing the grains by autoclaving or with propylene oxide was also effective. Mating data indicated that *T. turcica* comprises 2 compatibility groups, and that the compatibility reaction is controlled by 1 major gene locus.

Grosse-Brauckmann (E.). **Maßnahmen zur Mehltaubekämpfung bei verschiedener Gerstensorten, ihre Erfolgsaussichten und ihr Einfluß auf den Mineralstoffgehalt.** [Measures for the control of mildew in various Barley varieties, their prospects of success, and their influence on mineral content.]—*Z. Pfl-Krankh.*, **65**, 12, pp. 689–693, 1958.

In pot experiments at the Agrikulturchemisches Institut, Bonn University, infection of the barley vars. Weihenstephaner Mehltauresistente, Ackermann's Donaria, Hadostrena, and Peragis by *Erysiphe graminis* was inhibited by repeated dusting with sulphur and (more effectively) by the application of SiO_2 fertilizer at 50 g. silica gel/pot [cf. **37**, p. 229], combined treatment being the most successful. Resistance was the result neither of lower N uptake, nor of increased absorption of SiO_2, and the content of Ca, Mg, K, and Na was unaffected by infection. S treatment inhibited SiO_2 uptake fairly markedly, and to a lesser degree that of K_2O, Na_2O, and CaO. Fertilization with SiO_2 inhibited cation uptake. Weihenstephaner and Peragis maintained resistance even under conditions of high infection. Given treatment they were uninfected.

Rademacher (B.) & Schwarz (R.). **Die Rotblättrigkeit oder Blattröte des Hafers —eine Viruskrankheit (Hordeumvirus nanescens).** [Red leafiness or leaf reddening of Oats—a virus disease (*H. nanescens*).]—*Z. PflKrankh.*, **65**, 11, pp. 641–650, 4 fig., 1 diag., 1958. [English summary.]

At the Institut für Pflanzenschutz der Landwirtschaftlichen Hochschule, Stuttgart-Hohenheim, Germany, successful transmission experiments with *Rhopalosiphum padi* and *Metopolophium dirhodum* to oats and barley indicated that symptoms previously described on oats [*Arch. PflBau*, **8**, pp. 456–526, 1932] are caused by barley yellow dwarf virus [cf. **37**, p. 363]. The most conspicuous symptoms are yellow to carmine red stripes and flecks on the leaves, blasting of the florets, and stunting of the entire plants: they varied in severity with the oat vars. examined.

The disease has been observed mostly at the edges of fields, in late crops, and in

those with gaps in the stand; loss of crop is usually insignificant with good cultivation, though reduction in yield in individual plants infected early in the season may be quite severe. Control is best achieved by sowing early and close enough to achieve a closed stand.

Chapman (W. H.), Luke (H. H.), Wallace (A. T.), & Lunden (A. O.). **Multiple variation including crown rust resistance in irradiated Floriland Oats.**—*Agron. J.*, **51**, 3, pp. 163–165, 1 fig., 1959.

Certain oat lines derived from irradiated (thermal neutrons for 5 hr.) populations of Floriland, which is resistant to all prevalent races of *Puccinia coronata avenae* except the Landhafer races [**38**, p. 255], when grown in Florida exhibited a pronounced mesothetic reaction on inoculation with race 264 [cf. **37**, pp. 405, 406]. The reactions of other lines indicated mature plant resistance, but they were all resistant to races 264 and 290 under greenhouse conditions, and to race 264 under widely different field conditions.

Ivanoff (S. S.). **Comparative effects of chemical seed treatment on the control of two Helminthosporium seedling diseases of Oats: leaf blotch (Pyrenophora avenae) and Victoria blight (H. victoriae).**—*Plant Dis. Reptr*, **43**, 2, pp. 180–183, 1959. [24 ref.]

After reviewing the literature on leaf blotch [cf. **36**, p. 641] the author notes that at Mississippi Agricultural Experiment Station, State College, laboratory tests with ceresan M, ½ oz./bush. gave complete control compared with 65% incidence from the untreated seeds. The same method reduced the incidence of *H. victoriae* from 99% to 12%. The latter induced rotting of the seedlings at 100% humidity and 24–28° C. While Victoria blight is normally controlled by use of resistant vars. there is no known var. resistant to leaf blotch.

Syamananda (R.) & Dickson (J. G.). **The influence of temperature and light on rust reaction of inbred lines of Corn inoculated with specific lines of Puccinia sorghi.**—*Phytopathology*, **49**, 2, pp. 102–106, 1959.

Further details are given of studies at the University of Wisconsin, Madison [**37**, p. 83; **38**, p. 365], in which 8 inbred lines of maize inoculated with 1 or more uredial, clonal lines of *P. sorghi* were grown at either constant temps. or alternating day (8 hr.)—night temps. The mean incubation periods at 28, 24, 20, and 16°, respectively, were 9·2, 7·1, 6, and 5·3 days, differences between the maize lines being significant only at 16°; those at day–night of 28°–20° and 24°–16° were 7·5 and 6 days. The lines GG 208 R and B 38 with single, dominant allelic gene pairs conditioning resistance were resistant to line 1–20, but only moderately so to 921. B 38 was entirely susceptible to line 904 at 28°, but resistant when alternated from 28–20°. B 14 and 156 were susceptible at all temps. Pop 35, with rust resistance conditioned by 2 recessive gene pairs, reacted very differently to the 4 lines of the pathogen, being in general resistant at the high and low temps. and less so at the intermediate temps., when the high resistance to 904 was replaced by a mesothetic reaction.

Supplementary illumination in the greenhouse during winter for 16 hr. daily (including the normal daylight period) decreased chlorosis round infection sites and increased the resistance of Pop 35 to line 9255 at 20 and 24° and to 1–20 at 24°. The results indicate the complexity of the physiological and genetic expression of obligate parasitism and show the need to determine the range of stable phenotypic reaction of lines used as host differentials.

Likhtman (T. G.). Пузырчатая головня Кукурузы на участках гибридизации. [Blister smut of Maize in districts of hybridization.]—*Zashch. Rast., Moscow*

[*Plant Prot., Moscow*], *1958*, 4, p. 52, 1958. [Abs. in *Referat. Zh. Biol., 1959*, 7, p. 203, 1959.]

In the Sumski region, U.S.S.R., Voronezhska 76 maize plants grown from seed treated with granosan developed symptoms of smut [*Ustilago maydis*: **38**, p. 203] at the sites where the tassels were removed. Plants of Zubovidnaya 3135 with intact panicles were not infected.

Kulik (T. A.). Устойчивость Кукурузы к пузырчатой головне. [Resistance of Maize to blister smut.]—Кукуруза [*Maize*], **3**, 7, pp. 35–36, 1 fig., 1958.

A survey by the Phytopathological Laboratory of the All Union Scientific Research Institute of maize stems and cobs naturally infected by smut [*Ustilago maydis*: **37**, p. 583] 15–20 days before ripening showed Dneprovskiĭ 66, 49, and 56, and VIR 42 to be the most resistant hybrids. Uspekh and Dnepropetrovskaya were not so resistant, but the cobs were hardly damaged.

In the laboratory the application of 1 ml. inoculum (1 g. chlamydospores/100 ml. water) to cobs without injuring the grain indicated that the hybrid from G 19 was completely resistant, followed by VIR 28, 26, 40, and 43, in that order.

Strakhov (T. D.) & Grechko (I. V.). Длительность сохранения возбудителя пузырчатой головни Кукурузы. [The length of viability of the causal agent of Maize blister smut.]—Бюл. Укр. н.-и. Ин-та Растен. Селек. Генет. [*Bull. Ukr. n.-i. Inst. Rasten. Selec. Genet.*], *1958*, 2, pp. 115–116, 1958. [Abs. in *Referat. Zh. Biol., 1958*, 21, p. 217, 1958.]

A physiological and morphological study showed that *Ustilago zeae* [*U. maydis*: see above] may survive for up to 78 days depending on external conditions. The main source of infection in spring is the over-wintered nodules and only partially from seed. Mycelial development on spore germination is subject to degenerative processes, which exclude the possibility of a saprophytic existence of the fungus and accumulation of soil infection.

Thayer (P. L.). **Some factors affecting Gibberella stalk- and root-rot of Corn.**—*Diss. Abstr.*, **19**, 4, pp. 653–654, 1958.

Stalk and root rot caused by *Gibberella* sp. is responsible for extensive damage to the maize crop in Ohio [**23**, p. 509] every year. In studies at Ohio State University high P reduced the amount of both diseases. The conc. of N and K had no apparent effect on root rot development, but they did affect stalk rot through a significant interaction: increase in N increased stalk-rot at medium and high levels of K; K at a high level with low N decreased it, had no effect with medium N, and increased it at high. High P with medium N gave max. inhibition of stalk and root rot consistent with opt. growth of the maize plants.

Stalk rot development in plants inoculated in the internode above the ear shank at 9–11 weeks was rapid during the 1st 3 weeks, but did not continue during the next 3 weeks. Stalk rot development was slow in plants similarly inoculated at 12–14 weeks, but the rot continued to develop during the entire 6 week experimental period.

G. roseum f. *cerealis* did not incite stalk rot when conidial suspensions or fungus-agar disks were placed behind maize leaf sheaths.

Cappellini (R. A.). **A comparison of techniques and sites of inoculation in field Corn artificially inoculated with Gibberella zeae (Schw.) Petch.**—*Plant Dis. Reptr*, **43**, 2, pp. 177–179, 1959.

At Rutgers University, New Brunswick, New Jersey, methods of inoculating maize with *G. zeae* [**37**, p. 39] by injection of a suspension [**17**, p. 811] or the insertion of inoculum on toothpicks, 2-in. pieces of pipe cleaner [**29**, p. 19], wheat kernels,

or agar disks into the stalk tissue were compared. Pipe cleaners were inferior in evaluating stalk rot resistance in a hybrid and an inbred. In inoculation of 4 inbred lines with toothpicks in successive internodes the rot produced was progressively greater from the 1st to the 4th [cf. **36**, p. 583].

ROJECKA (NADZIEJA). **Biała bakterioza (Bacterium stewarti E. F. Sm.) Kukurydzy.** [White bacteriosis (*B. stewartii*) of Maize.]—*Postęp. nauk roln.*, **4**, 2, pp. 69–72, 1957. [Abs. in *Referat. Zh. Biol., 1958*, 21, p. 216, 1958.]

B. [*Xanthomonas*] *stewartii* [map 41] was found on maize for the 1st time in Poland in 1952. Recommendations for control from the Puławy Institute for Plant Protection include strict quarantine, sowing healthy seeds, presowing treatment, introduction of resistant vars., and control of vectors.

VOLCANI (Z.). **A strain of Erwinia carotovora isolated from rotten Maize plants.**—*Ktavim* (*Rec. agric. Res. Sta. Rehovot*), **8**, 3–4, pp. 217–219, 1958.

Several mature maize plants in a field on heavy soil at Sede Ya'agov near Haifa, Israel, were affected by soft rot at the base of the stalk. *Pythium* sp. and a bacterium [cf. **38**, p. 141] isolated from the diseased parts each produced soft rot of the stem when inoculated into the collar and stem of very young maize plants under highly humid conditions. Plants 3–4 weeks old were infected by the fungus, but not by the bacterium. Neither organism infected plants in the flowering stage.

The bacterium was identified as a non-gasforming strain of *E. carotovora* [cf. **37**, p. 126], but it was not the primary cause of the lesions on mature field plants.

West African Maize Research Unit. Review of research for the period January 1955–December 1957.—50+4 (unnumbered) pp., Ibadan, Federal Dept. of Agricultural Research, [? 1958. Cyclostyled. Received April 1959.]

In the plant pathology section (pp. 30–50) [cf. **37**, p. 159] the assay of rust (*Puccinia polysora*) [**37**, p. 657] in Nigeria and Ghana is reported to show that temp. and humidity are the main factors governing the severity of the disease, and that max. intensity and spread occur under conditions of an ambient temp. of approx 80° F., with a small diurnal and seasonal range, and consistently high humidity. Inland, northwards, the disease is progressively limited by climate. *P. polysora* is strictly a 'tropical' rust, unlikely to constitute a threat to temperate maize growing areas. The opt. temp. for uredospore germination as determined at Ibadan is 80°, at which temp. and in contact with a water surface uredospores commence germinating within 2 hr. (3–4 hr. at 82° being reported from the French Cameroons [**35**, p. 11]). Air saturation is necessary for max. germination, and at 100% R.H. and a constant temp. of 77°, germination is 90–95%, whereas at 95·45% R.H. it is 0–2%.

Uredospore viability was found to be much less than in the Cameroons and French Equatorial Africa (6 months at low humidity, with a progressive decrease in germination from 92 to 35% [loc. cit.]). Max. viability (2 months) at 77° was obtained in storage at approx. 65% R.H., a value much lower than that prevailing under field conditions during the maize growing seasons. A longer viable period is associated with high day temps. and low humidity and rainfall. During the rainy months viability is greatly lessened.

To ascertain the inoculum density required to establish infection on seedlings of resistant and susceptible maize, leaves were inoculated with 0·01 ml. of a uredospore suspension in 0·1% agar solution in distilled water (in a series of dilutions) with an 'Agla' micrometer syringe and covered with polythene for 48 hr. Lagos White (susceptible) was 100% infected with a dilution theoretically containing 50 spores/ml., and 15% in the case of 1 spore; for 'resistant' Mexico 13, the figures were 100 and 5%; with low levels (< 10/ml.) more susceptible seedlings were infected than resistant, but at higher levels no significant difference was apparent.

Exact single spore inoculation was achieved best with a micro-pipette, used with a micro-manipulator and an Agla syringe. The resultant infections were: resistant vars. (Mexico 13 and Afro 880) 2 and 8%; intermediate (Mexico 5, Tsolo, Afro 53193, and Br. 129 Haiti) 5–8%; susceptible (Yellow Tuxpan—12, Red Flour, and Lagos White) 11–23%.

Comparisons of uredospore measurements from different parts of the world have already been noticed [**37**, p. 656]. The recorded host range of *P. polysora* includes 4 spp. of *Tripsacum*, *Erianthus divaricatus*, and *Euchlaena mexicana* [loc. cit.]. Of special interest are the numerous records on *T. laxum* in the Americas and the Caribbean area, as no records of rust on this host exist for Africa. Clonal material of *T. laxum* was introduced into Nigeria from Trinidad in 1945 (as a possible cattle fodder) and was at the time heavily infected by *P. polysora*. It was sterilized and multiplied. Repeated attempts recently to obtain infection of this clonal material have failed.

Information on the life cycle of *P. polysora* is still very incomplete, but teleutosori have been found in Dec. on maize at Ibadan. Physical and chemical stimuli employed failed to induce germination of teleutospores. On the basis of the available evidence *P. polysora* may be classified provisionally as a micro-cyclic, autoecious hemi-form.

Estimation of spore liberation [**37**, p. 657] from selected groups of pustules on potted maize, uredospores being removed with a cyclone spore trap twice daily and impacted onto the surface of 0·1% gelatin solution, indicated that 1 uredosorus on the susceptible var. Lagos liberates 1,500–2,000 spores daily for 18–20 days after emergence; on a resistant var. 600–1,150 were liberated. Each uredosorus on a susceptible host is, therefore, capable of producing $2{\cdot}7–4\times10^4$ spores during the life span. A Lagos White plant infected at the 7th week of growth could discharge approx. 14×10^9 uredospores.

Seasonal fluctuation [**35**, p. 383] of uredospores in the air was recorded: the content rises by early June near large acreages of maize (1st annual crop) to above 500/cu.m. and this value is maintained until harvest in early July; it drops to 100/cu.m. by early Sept., but after the 2nd crop is planted at the beginning of Sept. (pustules appear about mid-Oct.) the conc. rises rapidly to over 500/cu.m., falling by mid-Dec. to less than 10/cu.m. and to 0·2/cu.m. by Jan. The term 'primary epidemic threshold' is given to a conc. of 5 uredospores/cu.m. near maize crops at the time of the 1st season crop each yr. Even in the dry season there was an av. of 0·08 viable spores/cu.m., a possible method of carry-over of the rust.

During 1956 and 1957 preliminary seed dressing trials were made with 3 vars. of maize. Treatments included 25% thiram at 0·2% w/w+20% *gamma*—BHC at 0·3% w/w, a combined fungicide/insecticide dressing which gave a significantly better stand in the 1st trial than the components used alone. In the 2nd the dressing made no significant difference. It is suggested that high soil temp. and humidity may induce a toxic effect with some treatments due to an increase in the permeability of the seed coat to dressings.

In 1955 a number of S. American maize vars. at Ibadan showed leaf fleck symptoms [**37**, p. 203], which were greatly increased the following yr. The first indication of the disease is the appearance of small, circular, translucent spots near the tips of the older leaves. They are approx. 2–3 mm. diam. and are confined to intervascular areas. The spots gradually progress towards the base of the leaf and in some very susceptible vars. the intensity of spotting was as high as 22/sq. cm. Within a short time the tip and margins turn brown and the leaf dies within 10 days. In 1957 leaf fleck coincided with an unusually high incidence of *Rhopalosiphum maidis*. So far transmission to healthy maize has not been obtained either mechanically or with aphids.

During 1957 a peculiar water spotting was observed on leaves of the var. Tsolo.

The spots were oval, 0·5–2×0·2–0·8 cm., translucent and water soaked, and uniformly distributed over the entire leaf surface of the plant. No organisms could be isolated.

In 'stunting' the principal manifestation is a marked dwarfing and the complete suppression of the reproductive phase. Young leaves remain in a tight whorl, are often distorted and wrinkled, and the youngest have white transparent tissue at the base, where the mesophyll is suppressed. In glasshouse tests on seedling resistance to *Cochliobolus heterostrophus* no resistant vars. have been found so far.

Hashioka (Y.). **Disease resistance of the variety groups of Rice native to the different latitudinal regions in Asia.**—*Proc. 8th Pacif. Sci. Congr.*, **4** (B), 8, pp. 33–38, 1958.

Information is summarized concerning trials in Formosa with some 400 rice vars., details of which have previously been noticed [cf. **33**, p. 317].

Atkins (J. G.), Kramer (J. P.), & Hensley (S. D.). **Hoja blanca and its insect vector found on Rice in a second area in the United States.**—*Plant. Dis. Reptr*, **42**, 12, p. 1414, 1958.

'Hoja blanca' virus [map 359] was identified in rice fields near Bay Saint Louis, Hancock County, Mississippi, in Oct. 1958 and *Sogata orizicola* [**38**, p. 81], the vector, was collected in the same places.

Castellani (E.). **Outbreaks and new records.**—*F.A.O. Pl. Prot. Bull.*, **7**, 2, p. 29, 1958.

'Hoja blanca' virus disease of rice [cf. above] has recently been found in the Dominican Republic. According to growers, the disease has been known locally for over 20 yr. but has not before been reported. The known geographical range of the disease now also includes Costa Rica, and in Oct. 1958 the Caribbean Commission reported that its presence was suspected in Surinam.

Asada (Y.). **Studies on the susceptibility of akiochi (autumn-decline) Rice plants to Helminthosporium blight. (VII). Changes of the activities of oxidative enzymes in Rice leaves accompanied with the infection of Cochliobolus miyabeanus and the presence of these enzymes in the culture filtrate of the fungus.**—*Mem. Ehime Univ.*, Sect. 6, **3**, 2, pp. 157–164, 1958. [*Biol. Abstr.*, **33**, 4, p. 1240, 1959.]

In further studies [**37**, p. 719] it was found that although the oxidative enzyme activity of 2 rice vars. tested was greater when they were infected by *C. miyabeanus* than when they were not, some of the enzymes were lacking in a culture filtrate of the fungus.

Del Rivero (J. M.). **La tristeza de los Agrios. I. Historia, etiología y extensión actual. II. Origen y propagación.** [Tristeza of Citrus. I. History, etiology, and present extent. II. Origin and propagation.]—*Bol. Pat. veg. Ent. agríc., Madr.*, **23** (*1957–58*), pp. 15–23; pp. 25–29, 1959. [42 ref.]

A review of literature on citrus tristeza virus [cf. **38**, p. 143 *et passim*].

Kikacheĭshvili (Z. H.). Влияние некоторых химических элементов на анатомическую структуру Лимона и на восприимчивость его к мальсекко. [The effect of some chemical elements on the anatomical structure of Lemon and its susceptibility to mal secco.]—*Trud. Inst. Zashch. Rast. Acad. Sci., Georgia*, **12**, pp. 137–152, 1957. [Russian summary. Abs. in *Referat. Zh. Biol., 1958*, 21, p. 221, 1958.]

At the Nataneb Experimental Station of the Georgian Academy of Science the

Novo-Gruzinskĭ lemon, susceptible to mal secco (*Phoma* [*Deuterophoma*] *tracheiphila*) [map 155; **38**, p. 406], was treated with 14 chemical compounds; $FeSO_4$ induced resistance.

Beraha (L.), Ramsey (G. B.), Smith (M[arion] A.), & Wright (W. R.). **Factors influencing the use of gamma radiation to control decay of Lemons and Oranges.** —*Phytopathology*, **49**, 2, pp. 91–96, 1 fig., 2 graphs, 1959.

Studies by the U.S. Dept Agric. at the University of Chicago, Illinois [cf. **36**, p. 410], showed that the effect of irradiation on cultures of *Penicillium digitatum* and *P. italicum* varied with the medium and age of the culture. In Tochinai's liquid medium (*J. Coll. Agric., Sapporo*, **14**, pp. 171–236, 1916) *P. italicum* germinated $< 1\%$ after exposure to 467,000 rep, and 103,000 rep or more inhibited formation of colonies from spores streaked on potato dextrose agar, though mycelium survived 157,000; germination of *P. digitatum* was 7·2% after exposure to 483,000 rep in this medium. In Czapek's medium, however, *P. italicum* spores formed no colonies and mycelium did not survive 130,000 rep. After 200,000 rep 1–6-day-old colonies of *P. digitatum* on Czapek's agar made no new growth on transfer to potato dextrose; delayed growth occurred from 4–6-day-old, though not 1-day-old, colonies on Tochinai's; after 100,000 rep. colonies of all ages on Tochinai's resumed growth, but only 6-day-old, and to a lesser extent 4–5-day-old, on Czapek's. Doses of 50,000 rep had no effect on colonies on either medium.

Irradiation in sealed tins at 2,000,000 or 1,000,000 rep of lemons inoculated with *P. digitatum* 4–6 days previously eradicated surface mycelium, but caused softening and discoloration of the fruit. Doses of 500,000 and 200,000 retarded but did not entirely inhibit mould growth on the surface; at the higher dose softening of the rind occurred after 6 days, at the lower, not up to 9 days. The dose necessary to check well-established infection, therefore, causes considerable fruit injury. With lemons kept 18 hr. between inoculation and irradiation the max. holding periods and doses for extending storage life without radiation injury appeared to be about 12 days at 75° F. after 150,000–200,000 rep and 17 days at 55° after 150,000 rep. With *P. italicum* the opt. dose to prolong shelf life of lemons was 150,000 rep, after which they were held 15 days at 75° and 17 days at 55° without infection or adverse effect. The opt. dose for oranges stored at 75° was 200,000 rep, after which they kept satisfactorily for 20 days; for storage at 41° the opt. dose was 150,000–300,000 rep, when they kept for 65 days, compared with 15 days for the untreated.

Alternaria citri proved more resistant to irradiation than the *P.* spp., both *in vitro* and *in vivo*; also since the button-end rot it causes developed on irradiated oranges and lemons and not on untreated, it is concluded that treated fruit may be predisposed to secondary decay. *Cladosporium* sp., though causing no rot, proved even more resistant than *A. citri*.

Coffee in India. Planters' Guide and Calendar.—xii+80 pp., 3 col. diag., The Research Dept, Coffee Board, Balehonnur, 1958. 1 R.

This manual contains a chapter (pp. 29–32) on the common diseases of coffee and their control. The Board [cf. **37**, p. 236] has also issued 5 leaflets, Nos. 15–19, on coffee diseases [cf. **35**, p. 765].

Annual Reports 1956/7, 1957/8, Coffee Research Station, Ruiru and Coffee Research Services, Kenya.—xi+106 pp., 16 graphs, 1 col. map, 1958; ix+77 pp., 17 graphs, 1959. 25*s.* each.

Much of the information in these reports has already been noticed [cf. **38**, p. 293 *et passim*]. In the section of the 1st dealing with plant pathology (pp. 96–98) R. W. Rayner states that many of the K7 plants attacked by rust (*Hemileia vastatrix*) at Ruiru were morphologically not true K7 types, though the remainder

were and were attacked. Segregation had apparently occurred, as the rust could not be induced to infect certain F_2 K7 clones. Only 2 races of rust have so far been found in Kenya, II, which is widespread, and I, isolated from K7 plants in the Teita Hills.

In the corresponding section of the 2nd report (pp. 66–67) it is stated that when coffee was sprayed against rust with perenox at 10 and 5 lb./100 gal., 2 pints/tree, with Warley hand pumps in a trial using all combinations of the spraying times 16 Oct. 1957, 14 Jan., 17 Mar., and 28 Apr., the 1st count showed that the lower conc. [of the Oct. spray] gave about 50% control, the higher being 5% more effective; by Mar. the effect was only 10·8% for the former and 22·7% for the latter, after which the effect rapidly diminished, none being apparent in July. The Jan. spray showed a similar trend, the effect decreasing from a max. in March. Results of later sprays are still to be recorded. In another experiment, in which perenox, blitox, and Burgundy mixture were tested at $\frac{1}{2}$, 1, and 2% of Cu equivalent, the higher concs. of all 3 sprays were significantly effective, 10 lb./100 gal. giving valuable control of rust.

Over a period of 23 days little difference was observed between spore germination of *H. vastatrix* in the light and in the dark, but the total viability diminished with time. Race I had a much lower germination percentage than race II.

In the section of the 2nd report (pp. 71–73) dealing with coffee berry disease [*Glomerella cingulata*: loc. cit.] F. J. Nutman reports that in experiments from Mar.–Dec. 1957 a mercurial formulation containing 8-hydroxyquinoline appeared to be as effective as phenyl mercuric acetate, while its phytotoxic effects were milder. With all formulations tested, spraying considerably increased fruit and bean size; this was probably due to the increase in leaf area noted in Aug.–Sept., before secondary, phytotoxic effects became apparent. In laboratory studies, only 4% of a particular lot of spores germinated on green berries, though 66% germinated on flowers, but the different degrees of susceptibility of different vars. seem to be due to some chemical or physical difference in the epidermis of the berries.

Muller (R.). **L'ombrage du Caféier d'Arabie au Cameroun (régions Bamoun et Bamiléké).** [Shade of Arabian Coffee in the French Cameroons (regions of Bamoun and Bamiléké).]—*Agron. trop., Nogent*, **13**, 1, pp. 8–12, 1959. [English and Spanish summaries.]

In the mountainous areas of the French Cameroons Arabian coffee is sometimes planted very thickly, which in the dry season gives a damp micro-climate favourable to growth, but in the wet season the restricted ventilation and excessive humidity favour the development of *Corticium salmonicolor* [cf. **14**, p. 31; **37**, p. 513], which caused heavy losses in 1957.

Since 1954 the author has observed each year at the end of the dry season in both localities, particularly in Bamoun, a branch die-back due to *Colletotrichum coffeanum* [*Glomerella cingulata*: cf. **37**, pp. 513, 514] and closely associated with lack of shade. The sudden changes of temp. (from 5° C. at dawn, with copious dew, to 30° in a few hours in parts of Bamoun) and the rapid evaporation of moisture lead to a form of physiological injury which predisposes the trees to *G. cingulata*. The disease is a form of weakness due to a number of unfavourable circumstances, particularly the climatic conditions referred to. Heavy losses are sustained every year as a result. The best method of control is to plant suitable shade trees, thick enough to afford protection against sunburn, but not producing a damp enough environment for *C. salmonicolor*. The most suitable tree is *Albizzia malacocarpa*.

Orillo (F. T.) & Valdez (R. B.). **Four diseases of Coffee hitherto undescribed in the Philippines.**—*Philipp. Agric.*, **42**, 7, pp. 292–302, 8 fig., 1958.

Twig girdle and berry rot, 1st observed in 1956 on Arabica, Robusta, and Excelsa

trees, appears as minute cracks, usually on the vertical branch just above the brown wood, followed by water-soaking of the bark. During moist weather abundant mycelial growths ramify and the hyphae anastomose and form abundant white to pinkish bodies, like minute sclerotia. The infected bark finally peels off but the branch lives until the girdled portion is completely dried. Death of the top main stem results in the formation of abundant verticals, which when left unpruned favour rapid development of the disease. Sometimes the affected portion recovers, but the new bark growths are distorted and infected by the causal organisms and probably tide the fungus over from season to season. The stem infections may spread to the berries where they produce sunken, water-soaked lesions, covered by a dirty white to pinkish, floury mould. The beans of infected, mature berries are slightly affected. The disease is favoured by short periods of sunshine and intermittent showers and has been reproduced by inoculations with pure cultures and infected plant parts, but spores of the causal fungus have not yet been found on the host or in culture media, hence the causal organism has not yet been identified. Further studies are in progress.

Zonal leaf spot was 1st observed during the later part of Dec. 1956 on a few Arabica trees and in April 1957 on Robusta. A very similar disease has been reported in Porto Rico and Peru [**9**, p. 63] and attributed to *Cephalosporium* sp. The disease attacks mainly the leaves and produces circular to irregular lesions, with alternating gray and brown rings. When conditions are favourable the lesions enlarge rapidly. During the summer months infection is very slow and lesions are very irregular and without zoning. On the under surface of older lesions a white, compact mycelial mat appears during favourable conditions, on which spores of a *C.* sp. are borne. Similar symptoms have been observed on *Piper loheri*, *Calopogonium muconoides*, *Urena lobata*, and *Anamirta cocculus* growing close to infected coffee. Inoculations resulted in the appearance of the disease 12 days later.

Rhizoctonia blight was 1st observed on pigeon peas used as temporary shade for coffee transplants during the later part of Aug. 1956. It caused the death of all infected plants and produced abundant, large, light brown sclerotial bodies on the leaves. Some coffee transplants were also infected, and very similar symptoms were observed on 1-yr.-old coffee seedlings. During the later part of Aug. 1958 a severe form of blighting caused about 30–50% defoliation on 3–4-yr.-old Arabica trees. The fungus attacked the leaves, berries, and tender shoots and finally produced severe die-back. Infection on Robusta and Excelsa trees was slight. The disease is favoured by intermittent warm and rainy weather. No sclerotia were formed on infected plant parts or on potato dextrose agar. A very similar disease described from India is referred to as black rot or koleroga (*Corticium* [*Pellicularia*] *koleroga*) in Mysore [**13**, p. 230]. Irregular, water-soaked blotches may occur on any portion of the leaf blade and under favourable weather conditions the mycelium ramifies so rapidly that in less than a week the infected leaves may be totally blighted and drop to the ground. During dry spells the affected portions appear to be sun-scorched. The under surface of the blighted areas is covered by a thin yellowish-brown mycelial mat, discernible when the leaves are dry. Occasionally a mat composed of whitish, fine short-celled hyphae may also cover the underside of thick overlapping leaves. Infection on the berries is manifested by water-soaked sunken lesions. A disease with very similar symptoms has also been observed on *Gliricidia sepium*, *Centrosema pubescens*, *Piper loheri*, *Lantana carnara*, and a number of grass weeds, and was readily induced on cacao by inoculation. The authors consider the causal organisms to be a *Rhizoctonia* sp. [cf. **38**, p. 406] and to be different from that responsible for the thread blight disease in not producing the tree-like mycelial ramifications and concentric lesions on the infected leaves.

Thread blight disease, believed to be caused by *P. koleroga* [map 64], is probably not new to the Philippines but its occurrence apparently has not yet been reported.

It has been observed on Arabica, Robusta, and Excelsa trees in many parts of the country.

Duffield (P. C.). **Biology of Puccinia stakmanii.**—*Diss. Abstr.*, **19**, 3, p. 419, 1958.

In summer 1956 cotton rust (*P. stakmanii*) [cf. **37**, p. 85] reached epiphytotic proportions, with up to 85% losses, in the marginal zone of the Yaqui Valley, Sonora, Mexico, bounded by desert foothills, to which, with few exceptions, the principal alternate hosts *Bouteloua aristidoides* and *B. barbata* are restricted. The incidence diminished with distance from the foothills, so that 8–9 miles within the valley there were only traces of infection. High temp. and a dry atmosphere favoured max. development of the disease. Inoculations in summer 1957 caused 40% reductions in yield. *Gossypium hirsutum*, *G. barbadense*, and *G. klotzschianum* were highly susceptible, *G. aridum*, *G. davidsonii*, *G. armourianum*, and *G. stocksii* susceptible, and *G. arboreum*, *G. herbaceum*, *G. raimondii*, *G. gossypioides*, *G. anomalum*, and *G. thurberi* resistant. Teliospore germination was inhibited at 20 and 35° C., the opt. being 25°. Telial material in a completely saturated atmosphere discharged basidiospores for approx. 5 days [cf. **37**, p. 85].

Luc (M.). **Les nématodes et le flétrissement des Cotonniers dans le sud-ouest de Madagascar.** [Nematodes and Cotton wilt in SW. Madagascar.]—*Cot. et Fibres trop.*, **13**, 2, pp. 239–256, 3 fig., 1958. [English summary.]

Two types of wilt are described, a non-parasitic occurring on grey alluvial soils and tentatively attributed to an unfavourable structure of the upper layers or an unduly high conc. of Cl in certain layers, and a parasitic, associated with several *Fusarium* spp. (excluding *F.* [*oxysporum* f.] *vasinfectum*) and other fungi [cf. **35**, p. 295]. Five spp. of nematodes, including 2 new ones (the most widespread), have been found on the roots of both healthy and diseased plants, and it is thought that their attacks may facilitate penetration of the fungi.

Clinton (P. K. S.). **Effects of dressings with fungicides and insecticides on American Cotton in the Sudan central rainlands.**—*Emp. J. exp. Agric.*, **27**, 106, pp. 124–132, 1959.

Although tests in 1954–56 showed that fungicidal seed dressings used elsewhere in the Sudan against blackarm of cotton (*Xanthomonas malvacearum*) [**38**, p. 207] were unnecessary for the American var. BAR 7/8.I grown at the Central Rainlands Research Station, Tozi, they prevented the normal heavy losses in stands when combined with insecticides. From 2 series of tests with 9 seed dressing combinations in 1954 and 5 in 1955 yield improvement (20%) was obtained only once, where establishment was low: the use of a fungicide seed dressing, preferably an organo mercurial, together with an insecticide, preferably dieldrin, is recommended as an insurance against poor yields from low populations in adverse conditions.

Marciotte (C. V.). **Catalogacíon de variedades.** [Catalogue of varieties.]—*Rev. Invest. agric., B. Aires*, **12**, 1, pp. 97–104, 1958.

Data are given of the parentage and performance of 7 fibre flax vars. [cf. **37**, p. 355] developed at the Estación Experimental de Pergamino, Argentine. Mapún M.A. is susceptible to the locally predominant races of rust [*Melampsora lini*]. Pergamino Mapún 52 M.A.G. is immune. Achay M.A. is immune from rust races 19 and 40, is moderately susceptible to wilt [*Fusarium lini*], and has good resistance to pasmo [*Mycosphaerella linorum*], but tends to lodge. Calchaquí M.A.G. is highly resistant to wilt, immune from rust races 22 and 40, but susceptible to pasmo and prone to lodging; Pergamino Calchaquí 53 M.A.G. is identical with it, except that it is immune from rust. Pergamino Mocoví M.A.G. is resistant to wilt and immune from rust, but somewhat susceptible to pasmo. Ranquel M.A.G. is resistant to wilt, rust, and pasmo.

Rudakov (O.). Причины поражаемости Кенафа серый гнилью. [Causes of Kenaf infection by grey mould.]—С.-х. Киргизии [*Sel.-Khoz. Kirgiz.*], *1958*, 2, pp. 29–31, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 7, p. 206, 1959.]

In Kirgiz, U.S.S.R., infection of kenaf [*Hibiscus cannabinus*] by grey mould [*Botrytis cinerea*: **38**, p. 6] occurs mainly during the bud stage, particularly on late vars. under conditions of high humidity. Susceptibility increases with age.

Rossetti (Victoria) & Murel (G.). **Le développement du Puccinia antirrhini sur tissus de Muflier cultivés in vitro.** [The development of *P. antirrhini* on Snapdragon tissues cultured *in vitro*.]—*C.R. Acad. Sci., Paris*, **247**, 21, pp. 1893–1895, 1958.

Inoculation of various snapdragon [*Antirrhinum majus*] tissues *in vitro* succeeded only on sterilized stem fragments. It is suggested that the epidermis is concerned in the development of infection.

Vasil'evskiĭ (A. P.) & Kareva (Mme V. M.). Мучинистая роса Бегоний. [Powdery mildew on Begonias.]—Бюл. главн. бот. Сада. [*Bull. centr. bot. Gdn., Moscow*], *1958*, 31, p. 100, 1958.

In Feb. 1956 *Oidium begoniae* on begonias [**35**, p. 454] in the Orangery of the Central Botanical Gardens was effectively controlled by spraying with Cu-soap mixture (150 g. green soap+15 g. $CuSO_4$ to 10 l. water). Spraying may be repeated after the lapse of 20–24 days with the addition to the mixture of colloidal S (50 g./10 l.).

Brunt (A. A.). **Leaf-enations in Dahlia variabilis Desf. induced by Tomato spotted wilt virus.**—*Nature, Lond.*, **183**, 4661, pp. 627–628, 1 fig., 1959.

During a survey of virus infected dahlias in SW. England one plant of the var. Jean was found bearing enations; furthermore, it was stunted, with irregular leaf mottling, ringspots, and the so-called 'oak-leaf' or chevron patterns. Grafting to var. Willy den Ouden indicated infection by a str. of tomato spotted wilt virus [cf. **29**, p. 198]. There can be little doubt that the above-mentioned symptoms on dahlias in Britain, shown by these and other experiments to be induced by tomato spotted wilt virus, are identical with those originally reported to be caused by distinct non-sap transmissible viruses in America [cf. **12**, p. 374].

Sharan (N.). **Damping-off of Gul Mohur (Delonix regia Raf.) in India.**—*Plant Dis. Reptr*, **42**, 12, p. 1408, 1958.

A severe damping-off affected 35% of the *D. regia* seedlings at the Botanical Garden of the Agricultural College, Kanpur, in July 1955. *Pythium debaryanum* was isolated from diseased seedlings and shown to be pathogenic.

Palmer (J. G.) & Pryor (R. L.). **Evaluation of 160 varieties of Gladiolus for resistance to Fusarium yellows, 1958.**—*Plant Dis. Reptr*, **42**, 12, pp. 1405–1407, 1957.

At Beltsville, Maryland, corms of 161 gladiolus vars. were inoculated by rotating each over a hardware-cloth grid in sand saturated with a composite culture suspension of 6 isolates of *F. oxysporum* f. *gladioli* [**36**, p. 589], then planted in steam-sterilized hadite, which was later supplied with nutrient solutions. Non-inoculated corms were planted separately. For each var. the number of days before all the shoots developed symptoms, and the time in weeks from the 1st appearance of symptoms to 100% expression are recorded. Though no var. was immune there were varying degrees of resistance. A high incidence of yellows in the uninoculated indicated that the pathogen had been introduced into the plantings on the field-grown corms.

Apt (W. J.). **Studies on Fusarium diseases of bulbous ornamental crops.**—*Diss. Abstr.*, **19**, 3, p. 416, 1958.

In cross-inoculation tests at the State College of Washington, isolates of *F. oxysporum* f. *narcissi* from *Narcissus*, *F.o.* f. *lilii* from lilies, and what is considered a new form (*F.o.* f. *tulipae*) from tulips were demonstrated to be limited to their own hosts, but isolates of *F.o.* f. *gladioli* from crocus, gladiolus, and iris were pathogenic to other members of this group in addition to being highly pathogenic in the host of origin.

In iris the disease developed throughout the pH range 4–8, though it was from 4–6 that its progress was most rapid and symptoms soonest expressed. The onset was later and progress markedly slower at higher pH. The best growth of all 3 forms on a synthetic medium occurred on the acid side, though some growth occurred throughout the range 3·4–10·6 (initial pH).

Aycock (R.). **Soil treatment for control of Sclerotium rolfsii in Dutch Iris.**—*Plant Dis. Reptr*, **43**, 2, pp. 283–286, 1959.

At N. Carolina State College, Raleigh, spring row treatments during 1955–58 with terraclor (75% PCNB: 24 lb./acre, drenched in 1 ft. bands, 6 in. to either side) or furrow treatments (33 lb./acre) before planting in Oct., or sometimes both procedures, were found to be adequate in reducing the incidence of *S. rolfsii* [**34**, p. 455] and increasing yields of bulbs and flowers of Imperator and Wedgewood vars. in certain seasons only. When conditions were favourable for the disease only broadcast applications at 100–200 lb./acre were consistently effective, the smaller rate proving equally satisfactory. Soil fumigation with vapam at 100 and 150 gal./acre was phytotoxic, as was N-521 (90% 3,5-dimethyltetrahydro-1,3,5 2H thiadiazine 2-thione, Carbide & Carbon Chemicals Coy.) at 430 and 650 lb./acre. Vapam at 25 and 50 gal./acre reduced disease intensity somewhat but did not increase yield.

Sobers (E. K.). **Colletotricha associated with Lily bulbs. Their pathogenicity and host range.**—*Diss. Abstr.*, **19**, 3, p. 426, 1958.

Isolates of a *Colletotrichum* sp. from lesions on the bulb scales of a number of lily spp. imported from the Orient in 1950 and 1951 were found, at Louisiana State University, to be indistinguishable from the Easter lily (*Lilium longiflorum*) black scale fungus *C. lilii* [cf. **30**, p. 230]. Also 16 [*C.*] isolates from various bulbs and plant materials proved non-pathogenic not only to Creole Easter Lily (2 successive growing seasons) but also to bulbs of the type from which they were originally isolated. Bulbs of *Lilium callosum*, *L. candidum* (Cascade and White Elf), *L. cernuum*, Maxwell (*L. davidii*), *L. formosanum*, *L. henryi*, *L. japonicum*, *L. regale*, and *L. speciosum* vars. *album* and *rubrum* were not susceptible to *C. lilii* but *L. amabile*, *L. dauricum* var. *sanguineum*, *L. martagon* var. *album*, *L. pumilum*, *L. umbellatum*, and the Easter lilies Creole, Croft, Estate, and Georgia were susceptible. Pathogenic isolates could be distinguished by growth in liquid medium, but they had no adverse effects on flowering, plant vigour, bulb development, or forcing ability, though bulblet production of infected bulbs was significantly increased. At no time was the fungus observed on any part other than the bulb scales.

Raabe (R. D.). **Clasterosporium shot-hole of the Catalina, or Island, Cherry.**—*Phytopathology*, **49**, 2, pp. 116–117, 1 fig., 1959.

This is a more detailed account from the University of California, Berkeley, of the disease of *Prunus lyonii* caused by *C. carpophilum* [**37**, p. 94]. Symptoms are similar to those on peach or almond. Isolates from *P. lyonii*, peach, apricot, and almond proved cross-inoculable, but differed somewhat in culture [cf. **21**, p. 338].

Vasil'eva-Pupÿsheva (Mme L. I.). Болезни Лавровишни в Крыму. [Diseases of the Cherry Laurel in the Crimea.]—Бюл. глав. бот. Сада. [*Bull. centr. bot. Gdn., Moscow*], *1958*, 31, pp. 86–95, 3 fig., 1958.

Prunus laurocerasus in the Nikita State Botanical Gardens frequently suffers from a desiccation. *Laurocerasus officinalis* var. *schipkaensis* and its 2 forms *microphylla* and *zabeliana* are most severely infected. *L. officinalis* and its f. *angustifolia* are much less prone to desiccation and easily recover upon pruning. Fungi involved are *Phellinus* [*Fomes*] *torulosus*, *Inonotus* [*Polyporus*] *hispidus*, *Phomopsis padina*, *Diplodia laurocerasi*, and *Cytospora laurocerasi*, the last 3 new to U.S.S.R. *Oidium passerinii* and other leaf fungi cause premature shrivelling and leaf fall, which in some years entails considerable damage. In addition, 2 new spp. are described [without Latin diagnoses]—*Phoma laurocerasi* and *Phyllosticta laurocerasi*.

Rose wilt.—*Agric. Gaz. N.S.W.*, **69**, 11, pp. 592–594, 4 fig., 1958.

The disease caused by rose wilt virus in Australia [**10**, p. 733] is today the most serious disease of roses there [**34**, p. 283; **35**, pp. 187, 357]. It was believed to occur only in Australia, but there is a suggestion [based on similarity of described symptoms] that it may also occur in Italy [cf. **16**, p. 179] and Czechoslovakia [cf. **31**, p. 38]. In the nursery losses of Peace, Michele Meilland, Diamond Jubilee, Picture, Virgo, Pinocchio, Goldilocks, and Masquerade are invariably severe. *Rosa multiflora* is a symptomless carrier.

Badami (R. S.) & Kassanis (B.). **Some properties of three viruses isolated from a diseased plant of Solanum jasminoides Paxt. from India.**—*Ann. appl. Biol.*, **47**, 1, pp. 90–97, 1 pl., 1959.

Further information from Rothamsted Experimental Station is given on 3 mechanically transmissible viruses isolated from *S. jasminoides* from India [cf. **37**, p. 631]. One of the previously undescribed viruses is named tobacco wilt virus; it was much less readily transmitted by *Myzus persicae* than the virus Y strain [loc. cit.; **32**, p. 364]. The other, datura necrosis virus, was not transmitted by the insect. All had a wide host range, but neither the tobacco wilt nor the datura necrosis virus infected potato plants. All 3 have long, flexuous particles and similar general properties. Simultaneous infection with datura necrosis virus usually reduced the conc. of potato virus Y in tobacco, but not in *Nicotiana glutinosa*.

Govindu (H. C.). **Physiological variation in the stripe smut of grasses, Ustilago striiformis.**—*Diss. Abstr.*, **19**, 3, p. 421, 1958.

The 60 single teliospore isolates used in this study at the State College of Washington were from 46 collections representing 37 spp. of grasses in 19 genera. The fungus did not grow well on the usual synthetic media. Potato sucrose agar was best for enhancing spore germination and for subsequent growth. The response of an isolate from *Holcus lanatus* to the various components of Bacto potato malt agar indicated that potato infusion plus peptone combinations increases sporidial production. Detailed accounts are given of 'normal', abnormal, and aberrant types of teliospore germination. There were widely differing cultural types among the 60 isolates; those from 8 grass spp. developed teliospores in culture. Injection of spores into growing seedlings hypodermically was the most successful method of inoculation. A new var., *U.s.* var. *holci*, is reported.

Nielsen (E. L.), Dickson (J. G.), & Smith (D. C.). **Strain and seed treatment as factors in germination and seedling growth of smooth Bromegrass.**—*Phytopathology*, **49**, 1, pp. 8–11, 1959.

At the Agricultural Experiment Station, Madison, Wisconsin, stands of *Bromus inermis* were established in 1953 and 1954 from 16 commercial seed lots and vars.

and 16 experimentally developed seed mixtures. The seed was treated with orthocide, ceresan M, or arasan dusts at $\frac{1}{4}$ oz./bush. [cf. **35**, p. 528] or arasan was placed in the furrow at sowing. Initial differences between strains and treatments became less apparent as the season progressed, though were rather more persistent in 1954, a wetter year. The principal damage was caused by *Helminthosporium sativum* [*Cochliobolus sativus*] and *Pythium graminicola* [**38**, p. 396], *Fusarium roseum* also being abundant. *F. oxysporum* and *Rhizoctonia* spp. became more evident later in the season. *H. bromi* was found only in 1953. The strains from the south tended to be rather more tolerant of disease. Ceresan M proved somewhat less effective than the other treatments in 1953. In 1954 poorer stands developed from untreated lots (except Fisher) than from treated.

Freeman (T. E.). **A leafspot of St. Augustine grass caused by Cercospora fusimaculans.**—*Phytopathology*, **49**, 3, pp. 160–161, 1 fig., 1959.

This leaf spot on *Stenotaphrum secundatum*, recorded in Florida by the Agricultural Experiment Station, Gainesville, in 1952 but mis-identified, was widespread throughout the State in 1957. The dark brown to purple oblong spots on the sheath and leaf blades, 1–3 × 0·5–1 mm., develop a tan centre and sometimes coalesce. Spots caused by *Piricularia grisea* [**37**, p. 296] are somewhat similar, but larger, more oval, and lighter brown. The only other known record of a *Cercospora* sp. on the same host is from Bermuda [**4**, p. 262].

Kilpatrick (R. A.). **A disease of Ladino white Clover caused by a yeast Rhodotorula glutinis var. rubescens.**—*Phytopathology*, **49**, 3, pp. 148–151, 2 fig., 1959.

The disease was observed at Colebrook and Dover, New Hampshire, in 1957 and 1958. Symptoms somewhat resemble those of clover bacterial leaf spot [*Pseudomonas syringae*: **3**, p. 263]. Chlorotic, linear areas on the leaves coalesce and turn brown, with translucent, water-soaked margins. There are no symptoms on petioles or stolons. Small, light-tan pits develop on infected seed. At the University of New Hampshire, Durham, the fungus was readily isolated and grew well on potato dextrose agar, (opt. temp. circa 24° C.). Greenhouse inoculations (by rubbing the fungus on the under side of a leaf with the fingers) were more successful under humid conditions; peas, *Phaseolus vulgaris*, *Melilotus alba*, and 13 *Trifolium* spp. all proved susceptible. Infected leaf tissue of *T. maritimum* stained with safranin showed a breakdown of cellular structure. The pathogen can overwinter in diseased leaves.

Goth (R. W.) & Haglund (W. A.). **Uromyces trifolii on Peas.**—*Phytopathology*, **49**, 2, p. 118, 1959.

From the University of Minnesota, St. Paul, it is reported that in 1957 and 1958 uredospores of *U. trifolii* var. *fallens* [**37**, p. 99] able to infect both peas and red clover were collected on red clover in the field. Red clovers Wegener and Dollard were equally susceptible on inoculation; of the peas, Perfected Wales, Wasatch, and Cascade were more susceptible than Alaska and Allsweet.

Edmunds (L. K.). **Spring blackstem, a component of the blackstem complex of small-seeded forage legumes.**—*Diss. Abstr.*, **19**, 4, pp. 624–625, 1958.

At the University of Wisconsin inoculum from spring black stem (*Ascochyta imperfecta*) [**38**, p. 213], produced in any quantity desired by flooding various substrates (autoclaved lucerne stems are best) with a conc. spore suspension, was applied by atomization. Disease ratings were based on size and number of lesions and were usually recorded 14 days after inoculation. Of 37 legume spp., 35 became infected. A comparison of 23 isolates from lucerne and 33 from red clover on both hosts indicated significant differences between those from different hosts, locations,

and yr., as well as big differences between those from the same host. On the average lucerne isolates were more pathogenic and less variable than red clover ones, but a few of the latter from Chile and Mexico were more pathogenic on red clover. Isolates from Alaska were more pathogenic at low temp. than those from the U.S. The fungus was found to overwinter in naturally and artificially infected host material under field conditions in Wisconsin. Pycnidia developed in S. Wisconsin, from Jan.–May, with most forming in Apr. and few in the summer, but on Alaskan material collected in Aug. they were abundant. Below 25° C. pH 5 was opt., at higher temp. pH 4. The opt. for disease development was 20–24°, depending on the isolate, and at least 3 days in a moist chamber following inoculation.

Galli (F.). **Nota sôbre a ocorrência de Ceratostomella fimbriata (E. e H.) Elliot em Crotalaria retusa L. e Cassia fistula L.** [Note on the occurrence of *Ceratocystis fimbriata* on *Crotalaria retusa* and *Cassia fistula*.]—*Rev. Agric., Piracicaba*, **33**, 4, pp. 225–227, 1 fig., 1958.

The fungus was identified at the Escola Superior de Agricultura 'Luiz de Queiroz', University of São Paulo, Brazil, on the former host [cf. **27**, p. 185] collected at the experimental field station and on the latter at the Horto Florestal de São Simão. Symptoms are described.

Current research and investigation.—*Orchard. N.Z.*, **32**, 2, pp. 49–51, 1959.

In these notes for March 1959 from the Dept of Scientific and Industrial Research [cf. **38**, p. 239] the presence of some viruses on cherry trees in New Zealand is affirmed, many trees in every block examined having virus-like leaf symptoms. A 2-year trial at Motueka to ascertain the value of post-harvest sprays in the control of apple scab [*Venturia inaequalis*] on Delicious was concluded [**37**, p. 485]. The trees were severely infected in the season preceding the trial. Check trees, treated with captan/sulphur sprays only, had 6·4% infected fruit in 1957 and 8·9% in 1958; ascospray (5 lb./100 gal.) produced a statistically significant reduction of affected fruit in both yr. (2 and 2·2%); lime-sulphur and Bordeaux gave a significant reduction only in the 2nd yr.; 5% ascospray thus appears to be an effective 'clean-up' spray when applied just before leaf fall. Dual temp. storage (38° F. for approx. 6 weeks and thereafter 32°) reduced scald [cf. **37**, p. 588] in oil-wrapped Granny Smith at Auckland to 9% compared with 100% when stored throughout at 32°. With unwrapped fruit there was little difference between the 2 treatments in Oct. Fruit picked in early May had negligible scald in store on 1 Aug., compared with 88% in that picked in mid-Apr. At this stage there was no difference between the wrapped and unwrapped in the amount of scald. Where the fruit was stored to mid-Oct., wrapping reduced scald in the late-harvested fruit only. In mandarin orange var. trials Kara was found to be a high quality fruit, but the tree is susceptible to verrucosis [*Elsinoe fawcettii*]. In tangelo var. trials Minneola and Tiniura both appeared to be very susceptible to citrus blast [*Pseudomonas syringae*: cf. **35**, p. 236] and wither tip (*Glomerella* [*cingulata*]). Symptoms of what may be the scaly bark form of psorosis have been observed on Yalaha tangelo trees. This is the first evidence of the existence of this form of psorosis in New Zealand.

Cation (D.). **Some fungicide trials on tree fruits in 1958.**—*Quart. Bull. Mich. agric. Exp. Sta.*, **41**, 3, pp. 685–698, 1959.

In all, 24 fungicides or combinations of them were tested. Of 4 Olin Mathieson materials only OM-2086 caused some fruit russet on apples; all controlled brown rot [*Sclerotinia fructicola*] on Halehaven peach in some degree. G-1143 showed promise in control of apple powdery mildew [*Podosphaera leucotricha*: **36**, p. 597]. For sour cherry leaf spot (*Coccomyces* [*Higginsia*] *hiemalis*) [**36**, p. 18] cyprex at ½ lb./100 gal. proved satisfactory on Montmorency, though it retarded fruit ripening;

its borate and phthalate salts appeared to be possible alternative materials; the borate, however, materially increased russeting of Stayman apples and fruit cracking on Schmidt and Windsor sweet cherries. A ferbam-glyodin combination again gave satisfactory leaf spot control on Montmorency but appears to need renewal sooner than Cu sprays, phaltan, or cyprex. U9547 gave good leaf spot control, but actidione at 1 p.p.m. used with glyodin proved phytotoxic and should not be used in early season applications and only later if control is more important than possible injury. In combination with ferbam on Montmorency it retarded fruit size in 3 pre-harvest sprays. It appears best suited to later applications, at 1½–2 p.p.m. A combination of low soluble Cu+S and lime (1½ lb. 26% basic $CuSO_4$: 3 lb.: 3 lb.) was outstanding in control of rot (*Monilinia* [*S.*] *fructicola*) [cf. **36**, p. 456] and in preventing cracking of sweet cherries, but it left an unfavourable residue for fresh fruit sales. Low soluble Cu+lime (3: 3 lb.) again controlled leaf spot on Montmorency but reduced fruit size and caused foliage injury. Thylate showed good indications of control of brown rot.

Phybam S (a mixture of phygon, S, and ferbam) and ferbam-S-glyodin, both containing equivalent amounts of S, were outstanding in retarding powdery mildew infection on Jonathan apples, demonstrating the value of including 2–3 lb. S in early apple sprays where mildew is a problem.

Gilmer (R. M.) & Einset (J.). **Some bud mutations of Apple with virus-like symptoms.**—*Plant Dis. Reptr*, **43**, 2, pp. 264–269, 6 fig., 1959.

A description from the New York State Agricultural Experiment Station, Geneva, of fruit abnormalities of apple, 4 in Rhode Island Greening, 1 in Northern Spy, and 1 in McIntosh. Failure to transmit 1 abnormality on Greening (Keukelaar) indicated that it was not due to a virus but was a mutation that could be bud-perpetuated. Observational evidence indicated that the remaining 5 disorders were similar but not caused by virus. Affected fruit is commercially worthless; symptoms may easily be mistaken for those caused by viruses.

Brase (K. D.) & Gilmer (R. M.). **The occurrence of rubbery wood virus of Apple in New York.**—*Plant Dis. Reptr*, **43**, 2, pp. 157–158, 1959.

At New York State Agricultural Experiment Station, Geneva, rubbery wood virus was definitely identified for the 1st time in U.S. [cf. **37**, p. 486] in the apple root stock clone EM I. Symptoms developed in the 2nd yr. on the indicator var. Lord Lambourne propagated directly on rooted shoots taken from the mother stools, only 6% of which proved to be infected.

Atkinson (J. D.), Chamberlain (E. E.), & Hunter (J. A.). **Apple rubbery wood in New Zealand.**—*Orchard. N.Z.*, **32**, 1, pp. 2–3, 1 fig., 1959.

Symptoms of rubbery wood virus [map 305] were detected for the 1st time in New Zealand on 2 young Golden Delicious apple trees in 1954, and confirmed by grafting buds on to healthy Lord Lambourne trees. A number of Golden Delicious are now known to be infected. Although infected Lord Lambourne developed pronounced rubberiness each season, infected Golden Delicious showed no symptoms during 4 consecutive seasons; a severe strain of the virus was found in 2 blocks of young Golden Delicious trees. A control treatment tried out at Mt. Albert involved exposure to 99°±2° F. for 40 days: trees and virus survived the treatment.

Posnette (A. F.) & Cropley (R.). **Transmission of a virus causing star crack of Apples.**—*J. hort. Sci.*, **34**, 2, pp. 126–129, 3 pl., 1959.

In further work at East Malling Research Station the virus causing star crack on apple fruits [**35**, p. 303] was transmitted by grafting from infected to healthy Cox's Orange Pippin, and from infected to healthy Bramley trees. Virus from 18 sources

was isolated in Cox scions. Symptoms produced by some isolates but not others were delay in coming into leaf, die-back of 1-yr.-old shoots, lesions round the buds, and cupped, chlorotic leaves at the tips of terminal shoots in the autumn. All the strains cause fruit cracking but only the more virulent affect the bark and leaves.

Stojanović (D.). **Prilog proučavanju biologije i mogučnosti suzbijanja Venturia inaequalis (Cke) Wint.** [A contribution to the study of the biology and possibilities for control of *V. inaequalis*.]—*Zasht. Bilja (Plant Prot., Beograd), 1958*, 45, pp. 3–12, 2 pl., 5 graphs, 1958. [English summary.]

A 5-yr. investigation at the Kragujevac Agricultural Research Institute, Yugoslavia, on the saprophytic phase of *V. inaequalis* [**37**, p. 540] in apple leaves showed that maturation of ascospores begins early and is usually completed in the period before and during flowering, when max. discharge occurs. The 1st spray should be applied at the full bud stage or at flowering, when weather conditions allow, and a 2nd immediately after the flowers have faded. The customary 3rd spraying may be omitted. In central Serbia complete protection can be achieved with 2 sprays of 1% Bordeaux or a 1:40 mixture of sulphur and lime.

Riker (A. J.), Berbee (J. G.), & Smalley (E. B.). **Effects of crown gall and hairy root on the growth of Apple trees.**—*Phytopathology*, **49**, 2, pp. 88–90, 1 fig., 1959.

The results are reported from the University of Wisconsin, Madison, of observations made in 1957 on Yellow Transparent apple trees inoculated in Kansas in 1931 with crown gall (*Agrobacterium tumefaciens*) and hairy root (*A. rhizogenes*) [**13**, p. 777] and shortly afterwards transplanted to Madison. The trees were examined in 1938, when those infected by *A. tumefaciens* were not significantly smaller than the controls, but those with *A. rhizogenes* were; the same held in 1957. There was considerable callusing of original lesions, from which heart rot was not found to have developed.

Corke (A. T. K.). **The infection of pruning wounds by Gloeosporium perennans.**—*J. hort. Sci.*, **34**, 2, pp. 85–95, 1 pl., 1 graph, 1959.

The pruning wounds examined in further studies at Long Ashton Research Station [**36**, p. 193 and below] were on Cox's Orange shoots less than 1 yr. old, inoculations with *G.* [*Neofabraea*] *perennans* being made at 4-month intervals from Nov. 1955–Mar. 1957, and then every 2 months until Sept. 1957. Cut tips of shoots were more or less susceptible to infection by spores throughout the year. Cankers initiated in Nov. extended farthest, and those made in July least. Host reactions were the same as to branch cankers [loc. cit.]. Spore production from infected shoots was found to be greater from Nov. infections than from Mar., and to begin in both instances after 1 month; infections initiated in July first spored in Dec., and produced very few spores. Shoot cankers gave considerable numbers of spores in the wet months of Dec. 1956–Feb. 1957. As with branch cankers the peak spore collection for shoot cankers was in the June and July following inoculation.

Sharples (R. O.). **The response of Apple stems to wound infection by Gloeosporium perennans.**—*J. hort. Sci.*, **34**, 2, pp. 72–84, 1 pl., 10 fig., 1959.

Anatomical studies at Long Ashton Research Station, University of Bristol, of the establishment of *G.* [*Neofabraea*] *perennans* in inoculated artificial wounds on Cox's Orange apple branches [**38**, p. 89 and above] indicated that the fungus delayed the normal wound response, viz. the production of suberized barriers by bark phellogens and the blocking of xylem vessels by deposition of gum. The size and form of the lesion induced by inoculation largely depended on the extent to which normal wound healing was hampered. This delaying effect, and consequently the invasive-

ness of the parasite, was greatest during the period of host dormancy. Invasion was most rapid through the sieve tubes and the fibres of the outer xylem. Intracellular infection of the pith and medullary ray cells occurred in pruning wound infections. When the progress of infection had been arrested the phellogen and cambium laid down barriers of callus tissue consisting of parenchymatous outer cells surrounding a core of wound wood. The fungus survived as a saprophyte within the tissue thus isolated, forming acervuli at the exposed surface. Exceptionally, a limited spread of infection past the suberized barriers appeared to be effected through the fibre bundles of the inner cortex.

Sharples (R. O.) & Sommers (E.). **Control of Gloeosporium perennans with formulations of eradicant fungicides.**—*Plant Path.*, **8**, 1, pp. 8–12, 1 graph, 1959.

Further details are given of trials at Long Ashton Research Station on the control of *G.* [*Neofabraea*] *perennans* already noticed [**38**, p. 89]. Phenylmercuric chloride paint, solid, at 0·3%, dispersed in 90% (v/v) polyvinyl acetate latex, applied by brush on 6 July 1956, reduced the output of spores from stem cankers by 80% [loc. cit.] for at least 6 months, compared with untreated.

Bondoux (P.) & Bulit (J.). **Sur la pourriture des Pommes due au Cylindrocarpon mali (All.) Wr.** [On the rotting Apples due to *C. mali.*]—*C.R. Acad. Agric. Fr.*, **45**, 6, pp. 275–277, 1959.

A survey of stored apples started in 1958 at the Station centrale de Pathologie végétale, I.N.R.A., Versailles, France, showed that the cause of much of the rotting was *Nectria galligena* [**36**, p. 767] in its conidial state. A description is given of the symptoms, importance, method of infection, and possible control. In 1 lot of Reinette du Mans 2% of the fruits ($\frac{1}{4}$ of all the rotted) were affected. Other rot fungi detected were *Botrytis* sp., which was found on 6·6% of the Jonathan examined and 2% of Starking Delicious ($\frac{1}{4}$ of the rotted), *Gloeosporium fructigenum* [*Glomerella cingulata*], and *Penicillium* sp.

Pierson (C. F.). **Forecasting bull's-eye rots in Northwest-grown Apples in storage.**—*Plant Dis. Reptr*, **42**, 12, pp. 1394–1396, 1958.

In tests by the Agricultural Marketing Service, Wenatchee, Washington, storage of sample lots of apples at 60–70° F. shortened the incubation period of infection by *Neofabraea perennans* [**36**, p. 329; **38**, p. 266] and *Phialophora malorum* [**24**, p. 195] and provided an early forecast of the rots in the parent lot in cold storage, permitting marketing before symptoms appeared.

Pflug (I. J.) & Dewey (D. H.). **Construction for controlled-atmosphere Apple storage.**—*Agric. Engng, St. Joseph, Mich.*, **40**, 2, pp. 80–83, 86, 3 fig., 2 diag., 1959. [8 ref.]

Controlled-atmosphere (CA) storage is stated to be gaining ground in Michigan for the improved preservation of quality and control of certain disorders, e.g. brown core of McIntosh and spot and soft scald of Jonathans. The method necessitates the maintenance of a temp. range of 32–38° F. and modifications of the O and CO_2 levels in the atmosphere around the fruit. The attainment and maintenance of these conditions are discussed under the headings of structure, gas-proof lining and seal, refrigeration system, and auxiliary equipment.

The operation of CA storage is considerably more exacting than that of regular refrigeration. Thus, the 3% O and 5% CO_2 used for the above-mentioned vars. are the min. and max. values, respectively, that can be tolerated without damage. The gases must be analysed at least once every 24 hr. to determine the amounts of CO_2 to be removed and of O to be added.

Temp. should be closely observed and regulated particularly to avoid low temp.

in isolated areas of the room. The installation of 1 or more distant-reading thermometers within the fruit stacks is advisable. Where there are 2 or 3 storage rooms the temp. in different parts may be determined by means of a potentiometer thermo-couple system.

Stoll (K.). **Versuche zur Verhütung der Hautbräune an Äpfeln.** [Experiments on the prevention of scald in Apples.]—*Schweiz. Z. Obst- u. Weinb.*, **67**, 25, pp. 621–625, 3 fig., 1958.

As for technical and economic reasons oiled paper wraps [cf. **29**, p. 263] have not proved practicable in Switzerland, a number of other possible methods [cf. **38**, p. 266] have been tested at Wädenswil. Scald incidence can be lessened by packing in absorbent materials, such as cork waste and wood wool, giving good contact. Oil-impregnated wood wool was superior to impregnated shredded paper. Diphenylamine was effective, but often spoiled the flavour. Methods based on periodic alternation of temp. are held to merit further study, as is the use of Thor cold chambers with air-filtration [cf. **35**, p. 197]. The trees should be pruned so that the fruits get plenty of sun, picking should be done at the right time, and the fruit transferred to cold storage quickly.

Lefter (G.). **Comportarea unor soiuri de Par de atacul ciupercilor Mycosphaerella sentina (Fuck.) Schroet. si Endostigme pirina (Aderh.) Sydow.** [Response of some Pear varieties to infection by *M. sentina* and *E. pirina*.]—*Gradina, Via si Livada*, **8**, 2, pp. 38–41, 1959. [Russian, French, English, and German summaries in suppl.]

At the Geoagin Experimental Station, Romania, in 1956–7 the condition of 21 pear vars. attacked by *M. sentina* [**37**, p. 515] was observed in June (20 days after the appearance of the 1st spots), July, and Sept., when the attack was most severe. Curé, Doyenné d'Hiver, Fondante des Bois, Georges Boucher, and Beurré Liegel were most resistant. After 2 applications of 0·75% Bordeaux, on 6 and 25 May, the incidence decreased markedly even in the most susceptible vars. Alexandre Lucas, Olivier de Serres, Early Trevoux, Williams, and Beurré Liegel, which are resistant to *E.* [*Venturia*] *pirina* [cf. **36**, p. 6], are very susceptible to *M. sentina*. Appreciably resistant to both pathogens are Beurré d'Amanlis, Clapp's Favourite, Souvenir du Congrés, Beurré Hardy, Duchesse d'Angoulême, and Doyenné du Comice.

Ark (P. A.). **Control of fireblight of Pear with agrimycin formulations.**—*Plant Dis. Reptr*, **42**, 12, pp. 1397–1398, 1958.

In plot tests by the University of California, Berkeley, in an area of heavy natural infection by *Erwinia amylovora* [**35**, p. 615; **37**, p. 726], agrimycin 100 and 500 (the latter containing Cu) gave reasonable protection when applied every 4–5 days during the critical period, starting at 10% bloom. Sprays (containing 60 p.p.m. streptomycin, applied at 700 gal./acre) appeared to give a better and more lasting effect than the dusts (1,000 or 2,000 p.p.m., 50 lb.). With agrimycin 500 at 30 lb. there was a sharp increase in fireblight.

Blumer (S.). **Der Zwetschgenrost.** [Plum rust.]—*Schweiz. Z. Obst- u. Weinb.*, **68**, 2, pp. 26–30, 1 diag., 1959.

Of a number of kinds of *Prunus* rated at the Eidg. Versuchsanstalt, Wädenswil, for infection by *Tranzschelia pruni-spinosae* [**33**, p. 361; **36**, p. 377] in 1953, 1955, and 1958, all those of domestic plum and the myrobalans (*P. cerasifera*) were more or less susceptible, whereas some Burbank (*Prunus triflora*) selections were fully resistant.

Control by eradication of alternate hosts, *Anemone ranunculoides*, *A. coronaria*,

and other *A.* spp. [cf. **38**, p. 369], would be inadequate as the fungus can overwinter as uredospores. Chemical control is therefore necessary and various zineb preparations [cf. below] are effective. One application at the end of June is usually adequate. Some vars., however, are sensitive to this treatment, so that it cannot be unreservedly recommended.

Current research and investigation.—*Orchard. N.Z.*, **32**, 1, pp. 17, 19, 1959.

H. Jafar working at the Plant Diseases Division and Fruit Research Station of the D.S.I.R. has found that the most probable source of infection of peaches by rust [*Tranzschelia pruni-spinosae*: **38**, p. 153] is in the cankers formed on young wood of stone fruit trees on which spores are formed in late spring: these are then washed or blown on to surrounding leaves. Zineb (most effective), captan, and thiram all gave some control and were superior to a combination of lime-sulphur and colloidal sulphur. A spray in Nov. to check early infection and 3 sprays during Jan.–Mar. gave effective control.

Kostina (Mme K.). О мерах борьбы с вертициллезом-болезнью усыхания деревьев косточковых пород. [On control measures for verticilliosis-disease causing damping-off of stone fruit trees.]—Виноград. Садов. Крыма [*Vinograd. Sadov., Crimea*], *1958*, 3, p. 35, 1958. [Abs. in *Referat. Zh. Biol., 1958*, 20, p. 202, 1958.]

This is a report of the spreading of *Verticillium* disease in peach and other stone fruit trees in S. Ukraine, Crimea, S. Caucasus, and central Asia, with suggestions for control measures.

Young (R. A.) & Milbrath (J. A.). **A stem canker disease of fruit tree nursery stock caused by Phytophthora syringae.**—Abs. in *Phytopathology*, **49**, 2, pp. 114–115, 1959.

A destructive disease occurs [in Oregon] on young trees, especially peach and apricot, that have been bundled and heeled in and are exposed to rain. Bark injuries in handling provide infection courts and the disease may spread rapidly. Dark, slightly sunken cankers appear on the stems, which may be girdled, and cortical tissue becomes brown and necrotic. *P. syringae*, isolated from apricot, cherry, crab apple, and peach reproduced the disease on inoculation of the same hosts; symptoms were also produced on inoculation with *P. cactorum* and *P. parasitica*, but these were not found in naturally infected plants.

Boek (K.). **Untersuchungen über Viruskrankheiten der Süsskirsche.** [Investigations of virus diseases of Sweet Cherry.]—*Mitt. ObstbVersRing. Alt. Land.*, **11**, 9, pp. 232–238, 3 fig., 1956.

In this popular note from the Obstbauversuchsanstalt, Jork, Germany, the author describes Pfeffinger disease, which he attributes to a complex of [unspecified] viruses [incl. cherry rasp leaf], and [peach] ring spot [cf. **38**, pp. 268, 324]. In Alten Land 700 trees have been registered as affected by Pfeffinger, the distribution of which corresponds closely with that of the oldest cherry orchards. Ring spot is to be found throughout the fruit growing regions of the Lower Elbe.

Pfaeltzer (H. J.). **Onderzoekingen over de rozetziekte van de Kers.** [Investigations on the rosette disease of Cherry.]—*Tijdschr. PlZiekt.*, **65**, 1, pp. 5–12, 2 pl., 1959. [English summary.]

The author proposes that the terms Eckelrade or Pfeffinger disease of sweet cherry [cherry rasp leaf virus: cf. **31**, p. 560] be suppressed in favour of 'rosette disease', a name based on the most prominent secondary symptom, and already suggested by Lewis for the disease in the U.S.A. [**37**, p. 589]. White Burley tobacco plants developed small, white, sometimes necrotic or concentric rings on sap-inoculated

leaves, and concentric rings or line patterns on systemically infected ones. Cucumber seedlings showed small chlorotic spots on the cotyledons and a yellowish-green mosaic on the true leaves; the plants generally recovered. The virus was transmissible from these hosts to a number of other herbaceous plants, including *Chenopodium quinoa*, *Nicotiana rustica*, *Physalis floridana*, tomato, beet, *Tetragonia expansa*, *Tropaeolum majus*, lettuce, and *Gomphrena globosa*. In tobacco sap the virus was inactivated by 60–65° C. for 10 min., and the dilution end point was 1:100–1:1,000. No specific particles were detected.

Preliminary investigations at the Intituut voor Plantenziektenkundig Onderzoek, Wageningen, indicate that spread can occur through the soil [cf. **38**, p. 324].

NYLAND (G.). **Hot-water treatment of Lambert Cherry budsticks infected with necrotic rusty mottle virus.**—*Phytopathology*, **49**, 3, pp. 157–158, 1959.

In trials of this treatment at the University of California, Davis, budsticks were immersed at 50° C. for 10, 13, and 15 min. and at 52° for 5, 8, and 10 min., with a cold water dip afterwards. All treatments inactivated the virus: subsequent grafts showed 50° for 15 min. and 52° for 10 to have been about 70% effective in eliminating the virus and 50° for 10 and 13 min. and 52° for 5 min. 50% effective.

WADLEY (B. N.). **Rusty mottle virus complex in Utah.**—Abs. in *Phytopathology*, **49**, 2, p. 114, 1959.

Cherry necrotic rusty mottle (NRM), Utah Dixie rusty mottle, and cherry mild rusty mottle (MRM) [str. of cherry rusty mottle: **26**, p. 248] viruses are found in Utah. There are at least 3 str. of NRM, which spreads naturally to adjacent trees; Black Tartarian, Orb, and Deacon sweet cherries are nearly or completely symptomless and the Mazzard cherries vary in reaction. MRM inoculated above NRM on a branch almost suppressed all symptoms of the latter virus, but inoculated below, it had no effect.

Utah Dixie rusty mottle is caused by [peach] asteroid spot virus [**29**, p. 33]; Lambert, Bing, Deacon, and Van sweet cherries are more severely affected than Black Tartarian, Napoleon (Royal Ann), or Windsor, and Mazzards vary in their reaction. Apricot, Blue Damson plum, French prune, Manchu cherry (*Prunus tomentosa*), and desert almond (*P. fasciculata*) may carry this virus with few or no symptoms. MRM is not of economic importance in Utah.

HARTSTIRN (W.). **Correlation of strain reactions of ring spot virus of stone fruits with Prune dwarf, Sour Cherry yellows, and Peach stunt symptoms.**—*Diss. Abstr.*, **19**, 4, pp. 649–650, 1958.

The purpose of this study at Oregon State College [cf. **37**, p. 293] was to attempt a further comparison of 32 ring spot strains, 20 of which produced on *Sesbania* local lesions suitable for quantitative studies. Two watermelon vars. reacted with lesions to all but 4 strains. Isolates from trees with peach stunt, prune dwarf, and sour cherry yellows infected tobacco, but the other isolates did not. The reaction of tobacco to the viruses were: no infection, local lesions only, symptomless local infection, local lesions followed by systemic symptoms, local lesions with high virus titre in the secondary symptoms, and no symptoms on any part of the plant but a high virus titre.

No inoculated Pinto bean plants [*Phaseolus vulgaris*] developed virus symptoms.

The longevity periods of the 32 strains ranged from 2–84 hr., and their thermal inactivation points from 50–66° C., mostly at or close to 60°. Strains from trees with no history of sour cherry yellows, peach stunt, or prune dwarf generally had lower inactivation points and shorter longevity. These observations support the theory that ring spot, sour cherry yellows, prune dwarf, and peach stunt are caused by specific strains of the same virus or very closely related viruses.

Taylor (J.) & Clayton (C. N.). **Comparative studies on Gloeosporium stem and leaf fleck and Dothichiza leaf spot of Highbush Blueberry.**—*Phytopathology*, **49**, 2, pp. 65–67, 7 fig., 1959.

Observations at N. Carolina State College, Raleigh, showed that *G. minus* [**37**, p. 544] caused small, reddish flecks on leaves and young stems of *Vaccinium australe*, the foliage becoming malformed and the stem lesions developing as brownish pimples, 1–2 mm. diam.; necrosis does not become marked until the 2nd season after infection. Double spot is caused by *D. caroliniana* [**27**, p. 29]. The 2 parasites are distinguished by presence of a fruit body wall in the latter, the origin of the conidiophores, shape of conidia, and cultural characters (rapid growth and sporulation of the former, slow or none in the latter).

Cadman (C. H.). **Some properties of an inhibitor of virus infection from leaves of Raspberry.**—*J. gen. Microbiol.*, **20**, 1, pp. 113–128, 1959.

Further information is presented from the Scottish Horticultural Research Institute, Invergowrie, on the substance, probably a phenolic tanning agent [**37**, p. 697; **38**, p. 269], contained in raspberry leaves which prevents infection by viruses; it was lost on dialysis, precipitated by nicotine or added protein, and unaffected by boiling or freezing. Less of the substance was contained in leaves of peach and apple than in leaves of plum, cherry, raspberry, or strawberry. Its degree of inhibition depended on the virus. The amount of tannin required to produce a definite degree of inhibition of potato ring necrosis, tobacco mosaic, and tobacco necrosis viruses was in a fixed ratio to the amount of the respective viruses. The infectivity of the raspberry leaf extracts containing raspberry ringspot [raspberry Scottish leaf curl] or the beet ring spot strain of tomato black ring [cf. **37**, p. 463] viruses varied with the conc. of tannin and the pH, the increase of which was accompanied by the decrease in virus conc.

McKeen (W. E.). **Rhizoctonia rubi sp. nov. associated with the dry-berry disease of the Loganberry.**—*Canad. J. Pl. Sci.*, **39**, 1, pp. 82–85, 1 pl., 1 graph, 1959.

A description is given of *R. rubi* McKeen, isolated from incipient lesions on loganberry and boysenberry affected by dry-berry fruit, a destructive disease on the Pacific coast of N. America. The disease is quite distinct from the anther and stigma blight caused by *Hapalosphaeria deformans* [**12**, p. 772]. When green berries are half their mature size a brown discoloration of a drupelet begins at the base of the style, spreads rapidly, and within 24 hr. the fruit aggregate dries and crumbles; necrosis spreads $\frac{1}{4}$–1 in. down the pedicel. The disease progresses similarly in red unripe berries and similar symptoms are found on wild thimbleberry [*Rubus parviflorus*]. There are 1 or 2 peak periods of the disease for 1–2 days in June–early July. It does not spread from fruit to fruit. The pathogen forms pseudo-spores 8·6–4·3 × 11·8–7·5 μ. In epidemic years 30–50% crop loss may be caused; in some years there is only a trace.

Liu (S. C. Y.). **Biochemical variability, biological reactions of certain Strawberry viruses and their mechanical transmission.**—*Diss. Abstr.*, **19**, 4, pp. 613–614, 1958.

Virus was detected in 88% of 821 commercial strawberry plants representing 31 vars. indexed by inarch grafting on the indicator *Fragaria vesca* [**38**, p. 21] at the University of Minnesota. The viruses were classified into 14 types on the basis of symptoms. The yellows virus complex [cf. **38**, p. 217] was the most prevalent, whereas the crinkle virus complex [**32**, p. 573] appears comparatively rare in Minnesota. When both complexes were together introduced into indicator plants both kinds of symptoms appeared. The yellows complex, when introduced first, protected against crinkle. When mild yellows was challenged by any yellows com-

ponents, such as epinasty, yellows was more severe. Crinkle did not confer any immunity from the various yellows components.

When indicator plants were grown in tannin-free extract solutions of virus-infected plants symptoms, apparently resulting from virus infection, developed in 4–8 days. When grafted to healthy *F. vesca* they induced symptoms in the usual 4–8 weeks. Serological tests suggested that these virus complexes have different antigenic properties.

Stadler (L.) & Schütz (F.). **Virusfreie Erdbeeren.** [Virus-free Strawberries.]—*Schweiz. Z. Obst- u. Weinb.*, **68**, 2, pp. 30–35; 3, pp. 53–61, 10 fig., 1959.

In Switzerland virus infection of strawberries, which is present in most of the Wädenswil lines, generally causes inhibition of healthy growth rather than specific leaf symptoms. Heat treatment [**38**, pp. 93, 218] is recommended for eradication of infection and grafting to a clone of *Fragaria vesca* as a virus test. Methods of propagating healthy clones in insect-free glasshouses, in the open air with insecticidal protection, or in areas where strawberry aphids do not occur are discussed.

De Fluiter (H. J.). **Bladluisbestrijding ter voorkoming van virusverspreiding in Aardbeien.** [Aphid control to prevent spread of viruses in Strawberries.]—*Meded. LandbHogesch. Gent.*, **23**, pp. 745–769, 3 diag., 1 graph, 1958. [English summary, 2 pp.]

Part of this work has already been reported [**36**, p. 600]. In field experiments at Bennekom and Wageningen, Netherlands, in 1957 control of aphids (*Pentatrichopus fragaefolii*) by the systemic insecticide methyldemeton and parathion decreased the spread of virus, the former being superior. General recommendations are given for the control of viruses in both commercial and propagative fields.

Van Adrichem (M. C. J.) & Orchard (W. R.). **Verticillium wilt resistance in the progenies of Fragaria chiloensis from Chile.**—*Plant Dis. Reptr*, **42**, 12, pp. 1391–1393, 1958.

At the Plant Pathology Laboratory, Saanichton, British Columbia, seedlings of *F. chiloensis* from various parts of Chile were tested against a strain of *V. alboatrum* highly pathogenic to strawberry. Resistant plants were found in 3 of 8 collections and tolerant plants in 7 [cf. **37**, p. 729]. It is suggested that resistance in certain cultivated strawberries may have been introduced through *F. chiloensis* from both N. and S. America and that by selfing certain cultivated vars. resistant lines may be isolated.

Page (O. T.). **Observations on the water economy of Fusarium-infected Banana leaves.**—*Phytopathology*, **49**, 2, pp. 61–65, 1 diag., 3 graphs, 1959.

In experiments on behalf of the United Fruit Co. at La Lima, Honduras, 1-yr.-old Gros Michel banana plants, alternately healthy and affected by Panama disease (*F. oxysporum* f. *cubense*) [cf. **37**, p. 174; **38**, p. 156, *et passim*] to the extent that vascular browning was confined to the outer 9–10 leaf sheaths, were cut at 0·3 m. above ground and the wt. of the cut plants was recorded over the ensuing 50 min.; this was done from 7–10.30 a.m. on consecutive days at a mean temp. of 32° C. and mean R.H. 67%. Total wt. loss for healthy plants was 510 g. and for diseased 141 g. When plants with pseudostems of mean diam. 18·9 cm. were severed the total vol. of exudate (94–96% aqueous) over 5 min. from diseased stems averaged 73 ml. and from healthy, 132 ml. The continued exudation from cut stumps and uptilted severed pseudostems indicated flow under pressure. When 1·5 m. sections of pseudostem were placed horizontally and the exudate from both ends collected, that from healthy was 65 ml. (2·35 µl./cu. m.) more than that from an equal volume of diseased pseudostem.

Glass rods were passed through the lumina of large metaxylem vessels (inside diam. 0·2–0·25 mm.) of pieces of vascular bundle, 1–2 cm. long, dissected out from leaf sheaths as free from adhering parenchyma as possible. There was no debris from healthy vessels but a brown, amorphous substance was collected from some of the diseased; eosin passed through such vessels after the plugging material was removed. In addition, flow of water through 15 × 50 mm. cores from the centre of diseased pseudostems was slower than through healthy. Finally, transpiration rates from the lamina of the 1st unrolled leaf were higher in healthy plants. It is considered that tracheal obstruction plays a large part in the Panama disease syndrome, in addition to the possible action of toxins, now being studied.

Calpouzos (L.), Theis (T.), Rivera (Carmen M.), & Colberg (C.). **Studies on the action of oil in the control of Mycosphaerella musicola on Banana leaves.**—*Phytopathology*, **49**, 3, pp. 119–122, 1 fig., 1959.

In studies by the U.S. Dept Agric. at Mayaguez, Puerto Rico, complete control of *M. musicola* on banana leaves [**38**, p. 218 *et passim*] was given by orchard spray oils nos. 35 and 40, both used commercially and containing up to 10–25% aromatic compounds, pharmaceutical mineral oil, composed almost entirely of saturated hydrocarbons and very stable, and silicone fluid 555, a synthetic oil chemically different from the above petroleum oils and much more inert. However, at rates much higher than those used in the field, they failed to inhibit germination of the conidia and ascospores, only slightly lowered stomatal penetration (21% germ tubes penetrating a leaf surface treated with the mineral oil; 29% on the untreated), and did not inhibit mycelial growth, ascospore discharge, or the production of conidia. It would appear, therefore, that inhibition of the fungus occurs within the leaf, and this is to be studied further.

Buddenhagen (I. W.) & Sequeira (L.). **Disinfectants and tool disinfection for prevention of spread of bacterial wilt of Bananas.**—*Plant Dis. Reptr*, **42**, 12, pp. 1399–1404, 2 fig., 1958.

Of 18 chemicals tested at the Coto Research Station, Golfito, Costa Rica, against *Pseudomonas solanacearum*, only formaldehyde was considered satisfactory for the disinfection of pruning knives in the field [cf. **37**, p. 493]. Complete immersion in a 10% solution for 10 sec. is recommended, or 2 knives may be used and each immersed alternately in 5% for 30 sec. On some farms suckers are pulled off by hand and knives used only for more extensive pruning.

Murray (D. B.). **Deficiency symptoms of the major elements in the Banana.**—*Trop. Agriculture, Trin.*, **36**, 2, pp. 100–107, 4 col. pl., 6 fig., 1959.

Symptoms of deficiency in N, P, K, Ca, and Mg in Dwarf Cavendish banana in sand culture are described and illustrated.

Boyce (A. M.). **Avocado research at CES.**—*Calif. Citrogr.*, **44**, 3, pp. 76, 88–93; 4, pp. 134–137, 1959.

This is an account of the more important current research into diseases of avocado [cf. **35**, p. 907] at the University of California Citrus Experiment Station.

Phytophthora cinnamomi, a minor problem in the 1930's, is now a limiting factor in avocado production in many localities [cf. **37**, p. 295]. Root resistance is thought to hold out the greatest promise of control; 2 types have so far been found, viz. a very high resistance in 5 small-fruited vars. of *Persea* [cf. **38**, p. 22], and moderate resistance in seedlings of the var. Duke, which, however, vary considerably in this respect. Avocado pear sun blotch virus is graft-transmissible but has not yet been experimentally transmitted by sap inoculation or by insects. Seed transmission follows a complex but fairly well understood pattern: heat treatment of seeds and budwood is under study. *Dothiorella* rot (*Botryosphaeria ribis*) is the most

important rot of this crop in California. Among diseases not of general importance but under study is 'asphyxiation' or 'collapse' (*Verticillium alboatrum*).

Applications of N or P, or both, may result in visible symptoms of Zn deficiency. With many soils a single dose of Zn chelate at 1 lb./tree in the irrigation water [cf. **38**, p. 22] suffices to eliminate symptoms and to increase markedly the Zn level in the leaves for 3 yr. Air pollution of the oxidant type has been under study both at the Los Angeles State and County Arboretum, Arcadia. The characteristic stippling, principally of the upper leaf surfaces, in plants exposed daily for 2 weeks to an atmosphere containing 0·15 p.p.m. ozone [cf. **36**, p. 537] is also seen in seedlings exposed to natural smog in glasshouses at the 2 stations [cf. **38**, p. 130].

Alicbusan (R. V.) & Schafer (L. A.). **Diplodia rot of Mango.**—*Philipp. Agric.*, **42**, 7, pp. 319–322, 3 fig., 1958.

The 1st sign of this disease is the appearance of a violet discoloration, usually starting from the peduncle of the ripe fruit, which may be entirely rotted within 3–4 days. Infection may also start from bruises. *Diplodia* spores are formed within pycnidia 195–900 × 105–465 μ. Similar *Diplodia* spores were invariably found on the dried banana leaves generally used as packing material in mango crates; they were pathogenic to mangoes [cf. **30**, p. 51]. The use of other packing materials is recommended.

Legg (J. T.). **The effect of split leaf blotch and nettlehead virus diseases on the yield of Fuggle Hops.**—*J. hort. Sci.*, **34**, 2, pp. 122–125, 1959.

In trials conducted by East Malling Research Station in 1955 and 1956 at Bodiam Hop Farm there was a reduction of 50% in the dry weight yield of Fuggle hops showing symptoms of severe hop split leaf blotch virus [cf. **35**, p. 875], and of over 75% in plants infected by nettlehead virus [cf. **37**, p. 498].

Horner (C. E.). **Resistance of Hop seedlings to downy mildew.**—Abs. in *Phytopathology*, **49**, 2, p. 113, 1959.

Screening 70,000 hop seedlings over a 3-yr. period showed that there are 2 kinds of resistance to *Pseudoperonospora humuli* [cf. **37**, p. 51], to localized and systemic disease development. Differences were evident in the ability of hybrids to transmit resistance to their progeny; in 60 crosses the percentages of progeny that became systemically infected ranged from 0 to 24, those with 5/16, 3/16, and 1/16 Fuggle (resistant) parentage having 3, 6, and 10% systemic infection, respectively. Of 363 selected seedlings, 7% became infected in the field in contrast to 50–80% of susceptible vars.

Sabet (K. A.). **Studies in the bacterial diseases of Sudan crops. II. Bacterial leaf blight disease of Castor (Ricinus communis L.).**—*Ann. appl. Biol.*, **47**, 1, pp. 49–56, 1959.

Continuing his studies at the University of Khartoum, Republic of the Sudan [cf. **37**, p. 169], the author re-investigated the bacterial disease of *R. communis* originally attributed to *Phytomonas ricini* (*Trop. Agriculture, Trin.*, **4**, p. 124, 1927) and later to *Pseudomonas solanacearum* [cf. **13**, p. 565]. The Sudan species differs in pathogenicity and physiological characters from *P. solanacearum* and resembles *Xanthomonas ricinicola* (= *Bacterium ricini*) [cf. **8**, p. 221; **34**, p. 137] in characters, host range, and symptoms. On solid media the growth of *X. ricinicola* is typically yellow, while that of the Sudan strain is dirty white, but this difference is not considered sufficient to warrant the establishment of a new species. The original specific epithet is retained and the specific name *X. ricini* adopted; the Sudan bacterium is considered to be an atypical strain of this species.

Kljajić (Radojica). **Osipanje cvetova Pimpinella anisum L.** [The falling of *P. anisum* flowers.]—*Acta pharm. jugosl.*, **8**, 1, pp. 3–6, 1958. [English summary. Abs. in *Referat. Zh. Biol., 1959*, 4, p. 205, 1959.]

In Serbia and Croatia premature flower drop of anise is caused by *Plasmopara nivea* [cf. **11**, p. 73]. For control, seed and soil selection and treatment with Bordeaux mixture are recommended.

Radha (K.) & Menon (K. P. V.). **The genus Rhizoctonia in relation to soil moisture. I. Studies on Rhizoctonia solani and Rhizoctonia bataticola.**—*Indian Cocon. J.*, **10**, 4, pp. 29–36, 1 graph, 1957.

Investigations at the Central Coconut Research Station, Kayangulam, India, showed that *R.* [*Corticium*] *solani* and *R. bataticola* [*Macrophomina phaseoli*], both associated with coconut root (wilt) disease [**34**, p. 595], grew poorly in natural soil but well in autoclaved soil at a wide range of soil moisture, though *C. solani* was less tolerant of very low and very high levels. Evaluation of the soil microflora and its activity showed that the ability of the 2 fungi to grow was correlated with the microbial status of the soil, which was directly influenced by the soil moisture.

Pandalai (K. M.) & Menon (K. P. V.). **On the use of potash as a fertilizer with its effect on yield, quality and disease resistance in the Coconut Palm.**—*Indian Cocon. J.*, **10**, 3, pp. 12–28, 1 graph, 1957. [42 ref.]

The authors discuss the various roles of K [**38**, p. 311], its mobility in the plant, its conc., relation to other elements, and the effect of mineral manuring on yield and disease resistance. The last is discussed in relation to grey blight (*Pestalotia palmarum*), leaf and shoot rot, other leaf diseases, and *Fusarium*. A separate paragraph deals with K deficiency [**36**, p. 401] symptoms in the coconut palm.

Rozendaal (A.). **De betekenis van Professor Van Slogteren voor het serologisch onderzoek van de Aardappel virusziekten.** [The importance of Professor Van Slogteren in the serological investigation of Potato virus diseases.]—*Tijdschr. PlZiekt.*, **64**, 5–6 (Van Slogteren Nummer), pp. 371–378, 1958.

An appreciation of the work of Van Slogteren in this field [cf. **32**, p. 144 *et passim*].

Webb (R. E.) & Hougas (R. W.). **Preliminary evaluation of Solanum species and species hybrids for resistance to disease.**—*Plant Dis. Reptr*, **43**, 2, pp. 144–151, 1 fig., 1959.

The results of an evaluation by the U.S. Dept Agric. and the University of Wisconsin [**38**, p. 222] of approximately 200 selections of 39 *Solanum* spp. and 58 spp. hybrids are tabulated: 11 spp. and some hybrids were apparently resistant to potato virus A, and 9 spp. and 7 hybrids to potato virus X [**38**, p. 371]; a number showed some resistance to mechanical and/or aphid inoculation with potato virus Y which did not become systemic in 5 spp. and 1 hybrid. None was immune from leaf roll, though 55 selections were more resistant than Katahdin. In inoculation tests with *Verticillium alboatrum* 9 spp. and 4 hybrids failed to develop symptoms. All the hybrids were susceptible to potato spindle tuber virus [**33**, pp. 549, 685]; the spp. were not tested.

Semashko (Y.). Проблема устойчивости Картофеля к вирусным болезням и методика её исследования. [The problem of resistance in the Potato to virus diseases and methods for studying it.]—Международ с.-х. Журн. [*Internat. agric. J.*], **2**, 1, pp. 71–80, 1958.

The comparatively low yields of potato crops in Poland [**38**, p. 417] due to ineffective resistance to infectious diseases present a serious problem. In greenhouse and field experiments at the Institute for Plant Selection and Acclimatization, Želazna,

Central Poland, the various effects of virus Y and leaf roll (virus L) were studied and analysed. The methodology of the tests is described in detail.

Everest and Vulkan showed high resistance to virus Y and steady resistance to leaf roll. Flisak and Kolektiv were highly resistant to leaf roll and possessed steady resistance to virus Y. Other vars. with high resistance to Y were Dukat, Lipin'ske V, and Tukhol'ske, and to leaf roll Delfin and Ol'shtȳn'ske.

Ross (H.). **Virusresistenzzüchtung an der Kartoffel.** [Breeding for virus resistance in the Potato.]—*Europ. Potato J.*, **1**, 4, pp. 1–19, 7 fig., 1 graph, 1958. [English and French summaries.]

A general note from the Max-Planck-Institut für Züchtungsforschung, Köln-Vogelsang, Germany, recapitulating some earlier information [**38**, p. 71]. Hitherto the only known type of resistance to leaf roll [**38**, p. 221] has been the polygenically dominant type, but hybrids based on *Solanum acaule*, *S. andigenum*, *S. chacoense*, and *S. demissum* are much more resistant than the *tuberosum* vars. Extreme resistance to virus Y (any group of strains), inherited as a monomerically dominant character (Ry), is present in *S. chacoense* and *S. demissum*, and extremely resistant hybrids have been obtained, especially with *S. stoloniferum*. The Ry gene from the last-mentioned also determines extreme resistance to potato virus A. Hypersensitivity to virus X occurs in some Scotch vars., e.g. Craigs Defiance, being determined by 2 genes (Nx, Nb). Extreme resistance to this virus has been found in 41956 [**38**, p. 371], from which Saco and Tawa were derived, in *S. andigenum* CPC 1673, and in *S. acaule* (resistance inherited as a monomerically dominant character Rx independently of the X strains).

Rigot (N.) & Mélard (V.). **L'amélioration de la Pomme de Terre pour la résistance au virus de l'enroulement.** [Improvement of the Potato for resistance to leaf roll virus.]—*Europ. Potato J.*, **1**, 3, pp. 1–27, 2 fig., 4 graphs, 1958. [English and German summaries.]

At the Station de Recherches de l'État pour l'Amélioration de la Culture de la Pomme de Terre, Libramont, Belgium, the author determined the resistance to leaf roll virus of 171 commercial and breeding vars. of potato by examination of the progeny from unrogued plots and plantings in the immediate vicinity of infected plants. He concludes that resistance depends on factors for resistance to both leaf and tuber infection, and also for tolerance and sensitivity. The factor for tolerance appears to be dominant over that for sensitivity. High sensitivity together with low susceptibility is shown by the foliage of Apta and certain breeding stocks of the Max Plank Institut [cf. above].

Guthrie (J. W.). **Net necrosis of Russet Burbank tubers from seed-borne Potato-leaf roll-infected plants.**—Abs. in *Phytopathology*, **49**, 2, p. 113, 1959.

Of 392 tubers taken from plants infected by potato leaf roll virus in Idaho and examined 2 months after lifting 46% showed net necrosis [**38**, p. 221]. Tubers from infected plants transmitted the virus to the progeny whether net necrosis was present or not. Tubers from virus-free plants or those infected with potato crinkle [potato viruses X+A], rugose mosaic [potato virus Y, often +X], calico [str. of lucerne mosaic virus], or leaf rolling mosaic have not been found with net necrosis symptoms; isolations from tubers with such symptoms have yielded no culturable organism.

Manzer (F. E.). **Potato meristem culture and virus X.**—*Diss. Abstr.*, **19**, 3, pp. 423–424, 1958.

At Iowa State College apical meristems of the var. Irish Cobbler, subcuttings, and re-isolations, whether or not treated with malachite green [cf. **36**, p. 306; **37**,

p. 109], did not yield plants with a measurable reduction in potato virus X infection, and this method is therefore considered to be extremely limited in practical application and effectiveness. However, 4 virus-free plants were obtained from dormant tubers, one of which had been treated for only 1 hr. with a 100 p.p.m. solution of thiouracil.

Hansen (A. J.) & Larson (R. H.). **A yellow strain of Potato virus X.**—*Amer. Potato J.*, **36**, 3, pp. 98–104, 2 fig., 1959. [28 ref.]

At the Dept of Plant Pathology, University of Wisconsin, a new strain of potato virus X [**36**, p. 611] was isolated from the potato var. Green Mountain, in which it occurred in association with the strain X8 of the same virus [**35**, p. 37]. On *Gomphrena globosa* the lesions of the new strain appeared 72 hr. later than those of X8, and remained smaller. Inoculation from these lesions to *Nicotiana rustica* gave rise, after 10 days, to olive yellow chlorotic lesions ½ in. diam., the colour of which became more intense in the following 10 days: these lesions spread somewhat along the veins, but there was no necrosis.

It is concluded that while the reaction of *G. globosa*, serological relationship, cross-protection, and reactions in test potato vars. establish the virus as a strain of X, the symptoms in *N. rustica*, together with the lack of symptoms in inoculated leaves of tobacco and *Datura tatula*, distinguish it from previously reported strains.

Kameraz (A. Y.) & Shcherbakova (Mme N. M.). Вирус S и результаты его определения серологическим методом в листьях Картофеля. [Virus S and the results of its determination in Potato leaves by the serological method.] —*J. agric. Sci., Moscow*, **2**, 12, pp. 93–100, 1957. [English and German summaries.]

At the Pushkin Laboratory of the All Union Plant Breeding Institute, Leningrad, tests on 63 local and foreign potato var. demonstrated that the symptoms of virus S [str. of potato paracrinkle virus: cf. **38**, p. 26] vary considerably according to the var., weather, and the strain of the virus. It reduced yields by 10–20%. Výrypaevski, Kameraz 1, Kanoga, Kitting, Korenevskiĭ, and Ruslan have not been infected by the virus so far. Seedling tests did not disclose the presence of the virus, thus confirming the supposition that it is not seed-borne, but it is transmitted during direct contact of diseased and healthy plants.

Böning (K.). **Auftreten einer stolburähnlichen Kartoffelkrankheit in Niederbayern in den Jahren 1927 und 1928.** [Occurrence of a stolbur-like disease of Potatoes in Lower Bavaria in the years 1927 and 1928.]—*NachrBl. dtsch. PflSchDienst (Braunschweig), Stuttgart*, **10**, 9, pp. 129–133, 5 fig., 1958.

Potato stolbur disease [tomato stolbur virus] has not yet been reported with certainty in Germany [cf. **36**, p. 736; **38**, pp. 74, 332]. The author recalls a similar disease recorded in 2 localities only; he has not seen it since. Symptoms of primary infection appeared only on the youngest shoots of otherwise normal plants. Those of secondary infection, appearing shortly after germination, included leaf roll, yellowing (with occasional reddening of the leaf margins), rigidity, stunting, early withering and death of the plants, low yield, and poor germination of the tubers (spindle sprout). By contrast with 'classical' (southern) stolbur there was no sudden withering followed by death within a few days, no withering and rubberiness of the tubers, no concomitant root- and foot-rot, and no secondary fungal invasion. The disease was graft-transmissible to healthy stocks or scions. The poorly developed shoots from infected tubers were virus free and grew well when grafted to healthy stocks. Symptoms were similar on a number of potato vars. examined. The vector was not determined. Losses were 10% in one locality and 15–20% in the other.

Fedotova (Mme T. I.). Новое в работах по фитофторе Картофеля. [New contributions in the studies of *Phytophthora* in Potatoes.]—*J. agric. Sci., Moscow*, **4**, 2, pp. 129–130, 1958. [English, German and French summaries.]

The Pan-Soviet Institute for Plant Protection organized in 1957 and 1958 through the Potato Wart Stations an investigation of resistance to [unspecified] virulent races of *P. infestans* [**38**, pp. 28, 420]. The hybrids VIR R-415, 1249, 1264, 885, 339, R6–150, R6–885, and IKKh P–363 were resistant in the haulm and tubers. Cultures of the virulent races are kept under sterilized sunflower seed oil, where they produce a great number of spores which grow with unusual speed, and the virulence of the fungus remains unchanged for several months.

Gallegly (M. E.) & Eichenmuller (J. J.). **The spontaneous appearance of the Potato race 4 character in cultures of Phytophthora infestans.**—*Amer. Potato J.*, **36**, 2, pp. 45–51, 1959.

In further work on blight resistance [cf. **37**, p. 369] using single sporangium and single zoospore isolates of 10 cultures representing different physiologic races of *P. infestans* on potato it was found that any race will change readily to include the race 4 character additionally. There is probably a mutation of nuclei within the thalli, the mutant nuclei being carried in heterokaryotic mycelium along with the original nuclei. This tendency is thought to be perhaps the reason for the high percentage of race 4 noted in race surveys [cf. **34**, p. 610].

Brandes (G. A.), Bonde (R.), Cetas (R. C.), Samson (R. W.), & Rich (A. E.). **A review of uniform dosage and timing experiments comparing maneb and zineb fungicides on Potatoes in Maine, New York, Indiana and New Hampshire —1958.**—*Plant Dis. Reptr*, **43**, 2, pp. 201–212, 15 graphs, 1959.

When 4 concs. of dithane-M 22 at 100 gal./acre were compared with the standard tank mix zineb (2 qt. dithane D-14+$\frac{3}{4}$ lb. $ZnSO_4$) at 5-, 7-, and 10-day spray intervals in 4 different localities on 5 potato vars., in general the standard was superior to 0·5 lb. maneb, about equal to 1 lb., and inferior to 1·5 or 2 lb. in the control of early and late blights (*Alternaria solani*; *Phytophthora infestans*). The superiority of dithane-M 22 at 1·5 or 2 lb. was more pronounced with the 7- and (especially) 10-day intervals. Yield increase correlated well with disease control.

Middendorf (M.) & Kranz (J.). **Einfluss der Vortemperatur auf Infektions- und Erkrankungsdisposition der Kartoffelknolle für Alternaria porri (E.M.) Neerg. f.sp. solani.** [Influence of pre-temperature on the disposition of Potato tubers to infection and disease by *A. solani*.] —*Z. PflKrankh.*, **66**, 1, pp. 15–17, 1959.

At the Institut für Pflanzenkrankheiten, University of Bonn, Bona potato tubers, stored at 5° C. from harvest, then taken at mid-March, washed, sterilized, and transferred to 26° at high humidity for 28 days before wound inoculation with *A. solani*, proved more susceptible than controls kept throughout at 5° (49 infections/50 inoculations with spores compared with 23; with mycelial suspension 95/100 and 66). This is in line with observations in the field [**36**, p. 494].

Seĭketov (G. S.). Препарат триходермин. [The preparation trichodermin.]—Картофель [*Potato, Moscow*], **4**, 1, pp. 50–51, 1959.

Since *Trichoderma* [*viride*] is highly antagonistic to *Rhizoctonia* [*Corticium solani*], which causes black scurf in potatoes and other plants, one of its metabolic products 'trichodermin' [**36**, pp. 485, 681] was tested *in vitro* and under field conditions. In a test in 1955 with potato var. hybrid No. 12 at the 'Second Five-year Plan' State farm, Alma Ata, complete protection against *C. solani* was obtained and a 17% increase in yield. In 1956 at the V.I. Lenin State Farm and the Karagandinskaya

Agricultural Experimental Station, Alma Ata, a mixture of trichodermin, nitrobacterin, and phosphorobacterin was applied (at 250 g./ha.) before planting to tubers of the potato vars. Ul'yanovskii and Centifolia, susceptible to diseases under the conditions of the Southern regions. In the test beds 20% of untreated plants were infected by various diseases, including black scurf, and the yield was 200 centners/ha.; those treated with nitrobacterin+phosphobacterin were 5% infected (yield 226 c.); those given the mixture were entirely healthy and yielded 249 c.; with trichodermin alone the yield was 258 c. The effectiveness of trichodermin is retained throughout the growing period.

Kochetova (Mme Z. M.). Как бороться с фузариозами. [How to control fusarioses.]—Картофель [*Potato, Moscow*], **4**, 2, pp. 56–57, 1959.

To determine appropriate control measures for fusarioses [*Fusarium* spp.: see below] under the conditions of the Orenburg region, the potato vars. Rannaya Roza and Smȳslovskiĭ were planted on 10 and 25 May, 20 June, 1 and 10 July 1951–3. *Fusarium* wilt was less in May and July plantings than in the June, because of the high soil temp. (25–30° [C.]) for a longer time (period of shoot emergence and flowering), while shoot emergence in the May plantings and flowering in the June ones takes place when the av. soil temp. at a depth of 5–15 cm. is 15–18°. At soil temp. in the 25–32° range the plants are weakened and easily infected by *Fusarium* spp. By planting in July, therefore, *Fusarium* wilt and the no. of diseased tubers in the harvest can be reduced. For the S.E. the agricultural regulations recommend 20 June for summer planting, but plantings in the Orenburg region on this date suffer severely from fusarioses. In the S.E., therefore, potatoes intended for seed should be planted 1–10 July and watered not less than 3 times. This watering increases the tuber harvest by 50% and reduces soil temp. by 5–6°. By using tubers of the July planting for 'seed', yield can be increased and the number of plants infected by fusarioses reduced 3 times as compared with tubers from the May planting. The percentages of wilted plants from tubers of the July and May plantings, sown in May, were 3·2 and 11·2, respectively, and in those planted in July, 3·1 and 10·5%. The vars. Oktyabrenok, Varba, Ul'yanovskiĭ, and Yubileĭnȳĭ appeared resistant to fusarioses.

Vitukevich (É. R.). Изучение условий развития сухой гнили Картофеля при хранении. [A study of the conditions for the development of dry rot in Potatoes in storage.]—Науч. Тр. Укр. н.-и. Ин-та Овощ. Картоф. [*Nauch. Trud. Ukr. n.-i. Inst. Ovoshch. Kartof.*], *1957*, 4, pp. 257–263, 1957. [Abs. in *Referat. Zh. Biol.*, *1958*, 20, p. 199, 1958.]

In the Khar'kov region, U.S.S.R., *Fusarium caeruleum* [**37**, p. 54], *F. solani* [**37**, p. 550] and its var. *eumartii*, *F. sambucinum* var. *minus*, and *F. avenaceum* are the causal agents of dry rot [cf. above], which develops at 40–80% humidity and at a CO_2 conc. of up to 30%. The opt. conditions for storage proved to be 17–25° [C.], over 70% R.H., and good aeration.

Tolmsoff (W. J.) & Young (R. A.). **The influence of crop residues and fertilizer on the development and severity of Verticillium wilt of Potatoes.**—Abs. in *Phytopathology*, **49**, 2, p. 114, 1959.

In greenhouse trials [at Corvallis, Oregon] finely ground residues of barley, oats, clover, lucerne, and soybean were incorporated at rates representing 3, 6, and 9 tons/acre in field soil naturally infested with about 1,000,000 microsclerotia/ml. of *Verticillium* spp. [cf. **37**, pp. 370, 555]; N was added and the mixtures incubated for 6 weeks at 65–70° F. and then planted with Russet Burbank potato seed pieces.

Disease suppression was progressively greater with increasing rates of barley and oats, and markedly influenced at 9 tons/acre by the amount of N; 22 lb. N/ton of

residue reduced wilt, but did not prevent N deficiency, whereas 44–110 lb. suppressed wilt and increased yields. Plants in oat and barley residues survived 25–30 days longer than in the control or clover treatments.

Folsom (D.) & Friedman (B. A.). **Pseudomonas fluorescens in relation to certain diseases of Potato tubers in Maine.**—*Amer. Potato J.*, **36**, 3, pp. 90–97, 19 fig., 1959. [25 ref.]

At Maine Agricultural Experiment Station, Orono, Maine, *Pseudomonas fluorescens* [**36**, p. 348] was isolated frequently from the discoloured xylem and parenchyma of tubers, grown in the State, which had the red xylem disease [**27**, p. 494], infected bruise cracks, or pink eye, a condition affecting potatoes in fields where *Verticillium alboatrum* wilt [cf. **37**, p. 370] occurs, especially in wet soils, but not in dry; the pink discoloration of the parenchyma shows through the skin.

Some strains, which did not lose their pathogenicity during several years in broth culture, induced softening of potato slices and a progressive black rot within the tubers. Others produced neither. Black rot was more active at 35° F. than at 50 or 70°. Infection in bruise cracks was less frequent in uninoculated tubers dipped, before bruising, in solutions of agrimycin [cf. **36**, p. 348], sodium hypochlorite, or phygon, than in comparable undipped tubers. Stolon and tuber stem-end inoculation with *P. fluorescens* induced red xylem symptoms; while eye-end inoculation induced pink eye.

Bonde (R.), Akeley (R.), & Merriam (D.). **A method for testing seedling progenies of Potato for ring-rot resistance.**—*Plant Dis. Reptr*, **43**, 2, pp. 198–200, 2 fig., 1959.

In this method devised by Maine Agricultural Experiment Station, Orono, and the U.S. Dept Agriculture young potato plants grown from true seed were inoculated by dipping the roots in a heavy slurry of *Corynebacterium sepedonicum* [**37**, p. 737] inoculum and then potted; symptoms of infection developed in 30–50 days compared with the 100–120 day period for inoculated tuber seed pieces. Many resistant seedlings were detected, lines from Saranac, B 319–Me1, and B 721–1 (selfed) having 46–50% resistant.

MacLachlan (D. S.). **Electronic heating as a means of sterilizing Potato bags contaminated with bacterial ring spot.**—*Amer. Potato J.*, **36**, 2, pp. 52–55, 1959.

At the Botany and Plant Pathology Division, Canada Dept Agric., Ontario, a 30 min. exposure in an electronic oven (2·45 megacycles, 3,100 watts) killed all ring rot bacteria [*Corynebacterium sepedonicum*: **38**, p. 386] in heavily contaminated jute strands scattered throughout a bale of 100 bags. In these trials exposure to 230° F. dropping to 169° over a 3 hr. period was lethal [cf. **37**, p. 505].

Sawyer (R. L.). **Black Spot Symposium summary.**—*Amer. Potato J.*, **36**, 2, pp. 76–78, 1958.

The author summarizes reports by N. S. Wright (British Columbia [cf. **37**, p. 54]), J. W. Oswald (California [**37**, p. 108]), W. C. Sparks (Idaho), H. V. Toko (Maine), R. L. Sawyer (Washington), and W. G. Hoyman (Washington) on black (blue) spot of potato [cf. **30**, p. 429] as it occurs in their various areas, and investigations in progress. The disorder in question, upon which all were agreed, is a black-grey discoloration beneath the skin, generally no deeper than the cambial layer, at the site of some previous surface bruise or pressure, insufficient to break the skin.

In California the var. White Rose has recently been seriously affected. High K fertilization reduces the disease somewhat, but neither sp. gr. nor K levels in the plant were correlated with its development, which begins only after potatoes are 70–75 days old. Susceptibility increases when irrigation is stopped before digging

but falls if the crop remains in the soil for over 2 weeks. In Idaho and Maine bruising from any cause is considered as an important contributory factor. In New York any factor reducing cell turgor is considered to influence black spot.

Brandenburger (W.). **Untersuchungen zur Schalennekrose der Kartoffelknolle.** [Studies on skin necrosis of the Potato tuber.]—*Phytopath. Z.*, **34**, 3, pp. 229–268, 16 fig., 5 graphs, 1959. [English summary.]

Studies at the Institut für Pflanzenkrankheiten, the Rheinischen Friedrich Wilhelms University, Bonn, Germany, showed that skin necrosis [cf. **37**, p. 3] is produced in tubers with a given predisposition by quick changes of temp. in Jan. and Feb. Predisposition seems to be caused by subnormal rainfall in June and July. The author was able to induce skin necrosis in suitable vars. or samples of suitable origin by cooling suddenly from 10–0° C. during Jan. and Feb.

The different types of necrosis (*Kartoffelbau*, **6**, pp. 263–265, 1955) gave the same picture macroscopically and microscopically. *Fusarium* spp. isolated from necrotic skin induced symptoms partly similar to those of skin necrosis but they developed further. Thus the isolated fungi cannot be regarded as the cause of the skin necrosis. Gases and poisonous solutions also caused symptoms showing a general similarity to skin necrosis, but only at concs. which never occur in potato storage clamps. There was no relationship between the disease and infection by mechanically transmissible viruses. The previously described type IV of skin necrosis is now considered to be lenticel spot [**20**, p. 175].

Tas (R.). **Les appareils à moteur dans la lutte chimique contre l'oidium de l'Hévéa.** [Motor equipment in the chemical control of *Oidium* disease of *Hevea*.]—*Bull. Inform. Inst. Etud. agron. Congo belge*, **8**, 1, pp. 51–64, 5 fig., 1959. [35 ref.]

After briefly noting the occurrence of *Oidium heveae* on rubber in the Belgian Congo [**37**, p. 513, *et passim*], the symptoms of the disease, and the chief factors affecting an outbreak, the author describes (largely from the literature) the different types of machinery available for dusting and spraying [cf. **38**, p. 32, *et passim*]. The methods of application best suited to the conditions prevailing at Yangambi are briefly stated and an estimate is made of the cost of dusting with portable machines, justified only when the losses sustained are appreciable.

Mangundojo (R. G. S.). **Pemberantasan tjendawan-akar putih Leptoporus lignosus (Klot.) Heim. ex Pat. (Fomes lignosus Klotzsch) dalam pertanaman karet.** [The control of white root disease *L. lignosus* (*F. lignosus*) in Rubber plantations.] —*Techn. Pertan.*, **6**, 2, pp. 37–67, 1957. [30 ref. English summary.]

An appraisal of *F. lignosus* on *Hevea* and various methods of control [**38**, p. 335].

Tafay (J. T.). **Varieties of Cane resistant to Fiji disease.**—*Philipp. Sug. Inst. Quart., 1958*, 1, p. 15, 1958. [Abs. in *Sug. y Azucar*, **54**, 3, p. 34, 1959.]

Of 8 new hybrids tested for yield and resistance to Fiji [virus] disease Phil. 48–15 and 48–21 are highly resistant and so are Phil. 49–4 and 49–14 in the plant cane, but their ratoons are susceptible; the quickest starters and most prolific were 49–22 and 49–4. All produced higher sugar yields/ha. than the highly susceptible standard var. Alunan.

Bubryak (I. I.). Сорная растительность и грибные болезни на опытных посевах Чая в Закарпатье. [Weeds and fungal diseases in the experimental Tea plantations in the Transcarpathian region.]—Науч. Зап. Ужгород. Ун-та [*Nauch. Zap. Uzhgorod Univ.*], **23**, pp. 101–107, 1957. [Abs. in *Referat. Zh. Biol., 1958*, 21, p. 221, 1958.]

In the 1st growing season (1954) and also in 1955 *Pestalotia theae* was widespread

and *Colletotrichum camelliae* was present in tea plantations in the Transcarpathian region, U.S.S.R.

Boedtker (Helga) & Simmons (N. S.). **The preparation and characterization of essentially uniform Tobacco mosaic virus particles.**—*J. Amer. chem. Soc.*, **80**, pp. 2550–2556, 6 graphs, 1958.

Details are given of a method developed at the Gibbs Laboratory, Harvard University, U.S.A., for the preparation of unaggregated suspensions of tobacco mosaic virus [cf. **33**, p. 639]. From physical data, including those from light scattering and flow birefringence [cf. **30**, p. 347], it is concluded for such suspensions that the TMV particle has a molecular wt. of 39·0 ±1·2 million, a length of 3,000 A, and an effective diam. of 149 A.

Gish (D. T.), Ramachandran (L. K.), & Stanley (W. M.). **Studies on the amino acid sequence of Tobacco mosaic virus (TMV) protein. I. Fractionation of products of tryptic hydrolysis by countercurrent distribution.**—*Arch. Biochem.*, **78**, 2, pp. 433–450, 27 graphs, 1958. [50 ref.]

At the Virus Laboratory, University of California, Berkeley, the countercurrent fractionation procedure was used to analyse the products of fractionation of TMV by trypsin. The number of fractions was larger than expected, perhaps as a result of further breakdown of the products during handling, or of the action of other proteolytic enzymes, e.g. chymotrypsin, present in the trypsin.

Hare (W. W.) & Lucas (G. B.). **Control of contact transmission of Tobacco mosaic virus with milk.**—*Plant Dis. Reptr*, **43**, 2, pp. 152–154, 1 fig., 1959.

In greenhouse experiments at Raleigh, N. Carolina, and State College, Mississippi, Dixie Bright 101 flue-cured tobacco plants 4 in. high were inoculated with tobacco mosaic virus (TMV) 30 min. after being sprayed with homogenized fresh milk [cf. **38**, p. 164] and similar plants of Early California Wonderland capsicum and Manalucie tomato were inoculated and sprayed with milk, powdered milk, or a mixture before or just after inoculation. In field experiments transplants of Coker 187 and Coker 187–Hicks tobacco at 5 localities were inoculated with TMV by contaminated hands and sprayed within 1 hr. at 5 gal./sq. yd. with homogenized, condensed, or dried milk.

Spraying the young plants prior to inoculation in all cases reduced infection markedly: from 90–100% in leaf inoculated unsprayed and 50–60% in stem inoculated unsprayed to 0–15%. Spraying after inoculation gave little control. In the field experiments infection at 4 weeks was reduced from 47–97% in the unsprayed to 11–43% after spraying. In 1 test spraying 24 hr. before inoculation resulted in no apparent infection after 2 weeks compared with 30% in the controls.

Lindner (R. C.), Kirkpatrick (H. C.), & Weeks (T. E.). **Some factors affecting the susceptibility of Cucumber cotyledons to infection by Tobacco mosaic virus.**—*Phytopathology*, **49**, 2, pp. 78–88, 2 fig., 8 graphs, 1959. [37 ref.]

Studies by the State College and the U.S. Dept Agric. at Wenatchee, Washington, showed that starch lesions on Chicago Pickling cucumber cotyledons stored for 24 hr. in the dark 6–7 days after inoculation with tobacco mosaic virus (TMV) and stained with 1:20 mixture of I in KI:lactic acid after removal of the chlorophyll with 70% ethanol at 80° C. provided a sensitive assay of the virus. The best results were obtained by dipping a cheesecloth inoculation pad (1×3 in., 12 layers thick) in a well agitated inoculum in distilled water containing 5% of 600-mesh carborundum by wt. and giving an area of about 25×25 mm. on each of 10 cotyledons 2 strokes with the pad before remoistening it. The number of lesions produced was directly proportional to the number of carborundum particles/epidermal cell; excessive injury of some cells is necessary for opt. results, but recovery from such

injury occurred within 24 hr. In other experiments the cotyledons were dusted with the carborundum and rubbed with the moistened pad—the best of several dusting methods tried, but only $\frac{1}{2}$ as effective as the 1st procedure. The considerable variance in susceptibility of individual cotyledons was reduced by about $\frac{1}{3}$ by using both cotyledons.

Virus conc. was related to the mean number of lesions/cotyledon (Y) according to the equation $Y = (pVaXsfC)(1+pVaXL)^{-1}$ where p is no. TMV particles/cu. μ of inoculum at 1 p.p. billion; V, mean vol. in cu. μ of the infection site (the drop of cytoplasm extruded by the cell puncture and then retracted [**37**, p. 183]); a, the fraction of TMV that is infective; X, the conc. of TMV in p.p.b.; s, the fraction of cells susceptible; f, the fraction of epidermal cells properly injured; C, the mean no. of epidermal cells/cotyledon; and L, the mean no./lesion. The area of the infection site was calculated to be 1·09 sq. μ and it was reckoned that experimentally 527,000 particles of TMV were needed to produce 1 lesion compared with 1,200 calculated for ideal conditions; assuming a single infection site/cell, 94 p.p.m. TMV were needed to provide 1 particle/site. The number of lesions is related to cell susceptibility, the only significant variable factor.

A number of experiments indicated that water alone had little effect on the number of lesions formed. Max. lesion formation occurred at 21–28° and seedlings grown at 32° were more resistant than those at 21°. Chilling plants at 2° immediately before inoculation could reduce susceptibility by 95%. Light was the most important factor, susceptibility being a function of the total radiation received by the cotyledons before inoculation. Under high light a max. of 11% of the cells was susceptible; under shade this was reduced to 0·2% and could not be increased by kinetin or gibberellin. Darkness before inoculation was necessary for max. susceptibility; a 24 hr. dark period after inoculation reduced the lesion count. There was up to 400% diurnal variation in susceptibility, the max. generally being between 1 and 2 p.m., but varying with individuals and with the season. Inclusion of nucleotides (more so than nucleosides, purines, or pyrimidines) sometimes increased the number of lesions with morning inoculations, but not afternoon. A surfactant (0·2% aerosol O.T.) included in the inoculum inhibited infection by 94%; applied 24 hr. after inoculation it still inhibited infection at 37% of the inoculation sites, the rate of infection process apparently varying at different sites.

Henderson (R. G.), Sears (R. D.), & Spasoff (L.). **Virginia 312, a new dark, fire-cured variety of Tobacco resistant to mosaic and root rot.**—Abs. in *Virginia J. Sci.*, N.S., **8**, 4, p. 267, 1957.

A widespread root rot of fire-cured tobacco in Virginia, probably caused by *Thielaviopsis basicola* and certain pathogenic nematodes, was reported at the 35th Annual Meeting, May 1957. Walkers Broad Leaf was moderately resistant but is susceptible to [tobacco] mosaic [virus], while the resistant Virginia 312 [cf. **38**, p. 226], though brittle and thereby subject to storm damage, produced the highest yield/acre of the 6 vars. tested in the advanced yield tests in 1955 and 1956, and it was 1st in dollar value in 1956.

Corden (M. E.) & Dimond (A. E.). **The effect of growth-regulating substances on disease resistance and plant growth.**—*Phytopathology*, **49**, 2, pp. 68–72, 4 graphs, 1959.

In further studies at the Connecticut Agricultural Experiment Station, New Haven [cf. **33**, p. 122; **37**, p. 113], 10 applications (50 ml./plant) of a number of naphthalene-substituted aliphatic compounds to the roots of 5–6 week old Bonny Best tomato plants over a 2-week period before inoculation with *Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici* induced resistance to wilt. Evaluated by a vascular discoloration indexes (no. internodes with the 3 large vascular bundles discoloured:

no./plant), 1-naphthaleneacetic acid induced the highest resistance (index 0·05), followed by 4(1-naphthyl)-butyric acid and its ethyl ester (0·2 and 0·21), and 3-(1 naphthoyl) propionic acid and its ethyl ester (0·34 and 0·35). Inhibition of vascular discoloration was not correlated with inhibition of leaf abscission or stimulation of root initiation, nor did the compounds appear to have direct fungitoxic action, but there was a direct relationship between induction of wilt resistance and inhibition of root elongation and it is suggested that these are physiologically related through modifications of plant pectic substances by growth regulators.

Cannon (O. S.) & Hanna (G. C.). **New disease resistant Tomatoes.**—*Calif. Agric.*, **13**, 3, p. 7, 1 fig., 1959.

Strains VF 6 and VF 11 of the tomato var. Pearson, developed from a cross of Southland and the Utah Experiment Hybrid no. 59–1, are resistant to wilt caused by *Fusarium* [*bulbigenum* var. *lycopersici*] and *Verticillium* [*alboatrum*: **37**, p. 746].

Threlfall (R. J.). **Physiological studies on the Verticillium wilt disease of Tomato.**—*Ann. appl. Biol.*, **47**, 1, pp. 57–77, 2 graphs, 1959. [39 ref.]

In studies at the Imperial College of Science, London, the water loss/unit leaf area of tomato plants of 2 vars. declined after inoculation with *Verticillium alboatrum* [cf. **36**, p. 68; **37**, p. 377]. At the beginning of wilt, water loss increased, but afterwards rapidly decreased, becoming less than that of healthy plants grown with an adequate or a restricted water supply. The transpiration of excised leaves from plants grown with a limited water supply was reduced, but to a less extent than that of leaves from infected plants. Water loss from leaves on infected plants was reduced irrespective of any blocking of the petiolar xylem. The rate of water loss from turgid leaf disks on mannitol solutions and the rate of water uptake of leaf disks on water was similar for disks cut from wilting or turgid leaves of diseased plants or healthy plants grown with adequate or restricted water. Disease or insufficient water reduced leaf growth, but had no effect on the rate of leaf initiation. On leaves of infected plants the density of stomata was higher than on healthy plants, but the stomatal area was less.

The resistance to water flow in diseased stems was high and was correlated with vessel blockage, about half the blocked vessels containing hyphae. The severity and localization of symptoms in inoculated plants on susceptible or resistant rootstocks was directly related to the extent of invasion by *V. alboatrum* and to vessel blockage.

The results indicate that 2 of the major symptoms of the disease, dwarfing and wilting, result from a gradual increase in water scarcity within the plant. The lower leaves of diseased plants are yellow and epinastic; as the petioles become infected they wilt irreversibly. Leaves with petioles not invaded may sometimes wilt, possibly because a blockage has occurred lower in the stem, but such leaves recover when cut and placed in water. It appears that wilting does not result from excessive water loss caused by alterations in the osmotic properties of the cells of the leaves. Work with culture filtrates indicates that the fungus can produce substances which block the vessels.

Sowell (G.). **Tomato fungicide testing on the west coast of Florida.**—*Plant Dis. Reptr*, **43**, 2, pp. 193–197, 1959.

In 4 trials on 2 vars. at the Gulf Coast Experiment Station, Bradenton, in 1955–57 maneb (1 lb./100 gal.) as manzate (1·5) or dithane M-22 (1·5), dithane D-14+ $MnSO_4$ (2 quarts+1 lb.), and dithane Z-78 (2 lb.) were equally effective in control of grey leaf spot (*Stemphylium solani*) and in effect on yield and quality of tomatoes, but dithane D-14+$ZnSO_4$ (2 quarts+1 lb.) gave lower yields despite an equal degree of control. The best leaf spot control was obtained with 2 lb. dyrene.

[cf. **37**, p. 314]. Tennessee tribasic copper sulphate at 4 lb.+100 p.p.m. streptomycin (agristrep) gave better control of *Xanthomonas vesicatoria* than did streptomycin at 200 p.p.m. or the basic $CuSO_4$ alone; $CaCl_2$ at 4 lb. for the control of blossom-end rot proved compatible with the carbamates and dyrene.

Raniere (L. C.) & Crossan (D. F.). **The influence of overhead irrigation and microclimate on Colletotrichum phomoides.**—*Phytopathology*, **49**, 2, pp. 72–74, 1 fig., 1959.

At the University of Delaware, Newark, the R.H. between noon and 6 p.m. in irrigated tomato plots [**36**, p. 215] was as much as 20% higher for 5 days after irrigation than in non-irrigated plots and the diurnal dew period was 3–5 hr. longer. In laboratory tests using Clayton's technique [**22**, p. 150] and a range of supersaturated salt solutions (*Tappi*, **33**, pp. 96–99, 1950) 90% germination of *C. phomoides* spores occurred after 6 hr. in water and 5–10% after 48 hr. at 93% R.H. [cf. **17**, p. 56], but spores kept for 12 hr. at R.H. below 80% failed to germinate when transferred to free water. Conditions induced by overhead irrigation therefore tend to favour the pathogen.

Ebben (M[arion] H.). **Brown root rot of Tomatoes. II. The fungal flora of the rhizosphere.**—*Ann. appl. Biol.*, **47**, 1, pp. 17–27, 4 graphs, 1959.

In further investigations at the Glasshouse Crops Research Institute, Rustington, Sussex [**36**, p. 359; cf. **37**, p. 250], it was found that steaming soil (at the end of Nov.) greatly reduced the numbers of fungi present, whereas fallowing had little effect. Steaming greatly reduced soil bacteria but after heavy watering in Feb., they increased to the level in unsteamed plots. The fungal populations of the outer rhizospheres of tomato plants in unsteamed plots in July were greater than in steamed, but by Oct. this difference disappeared, though roots in unsteamed soil had more disease than those in steamed.

Root surface counts indicated that the fungal populations on actively growing tomato roots in July in steamed and unsteamed plots reached similar levels; the numbers fell slightly in both in Oct. In the unsteamed, fungal infection of the roots increased between July and Oct., though root surface numbers declined.

The distribution of *Colletotrichum atramentarium* indicated that it was a root-inhabiting fungus; *Cephalosporium* spp. also were present on the root surface and in roots, especially in those from steamed soil.

The results suggest that a 1-yr. fallowing of glasshouse soils has little effect on the general microbiological population, whereas soil steaming has a marked effect, which, in the case of the fungal microflora, persists. Fallowing of the unsteamed plots slightly decreased the number of isolates of *Colletotrichum atramentarium*, and the occurrence of the fungus on the root surface also decreased. The appearance of *C. atramentarium* on roots in the steamed plots was most frequent in a plot which had borne a crop the year before, which suggests that the fungus survived chiefly in root debris left in the soil. Its isolation from root-surface washings and its absence from soil-dilution plates indicates that it is either confined to the rhizoplane or is present in a form (e.g. mycelium or spores) which does not occur freely in the soil. The general lack of correlation between rhizosphere populations and the severity of brown rot suggests that the total amount of fungal microflora does not directly influence the development of the disease, and that steaming gives effective control because it destroys certain particular pathogens or effects a change in some other soil factor.

Butler (E. E.). **Fungi and rots in California canning Tomatoes.**—*Plant Dis. Reptr*, **43**, 2, pp. 187–192, 1 fig., 1959. [26 ref.]

In California, tomato fruit diseases are seasonal and can be classed as pre-rainfall

and post-rainfall. In the dry period (Aug.–mid Sept.) fruit rots are caused mainly by *Geotrichum candidum* (syn. *Oospora lactis*) [cf. **29**, p. 338], *Rhizopus stolonifer* [**37**, p. 114], *Mucor hiemalis* [**35**, p. 553], and *Alternaria tenuis* [**37**, p. 739], but despite noteable losses the economy of the crop is not threatened at this stage. In the post rainfall (mid. Sept.–Oct.) period, however, when *A. tenuis* was the most frequently isolated (60% of fruit in 1956 and 51% in 1957), serious damage is caused.

From rotted fruit 13 fungal spp. were identified at the University of California, Davis, but *A. tenuis*, *Pleospora herbarum* [loc. cit.], *G. candidum*, and *Botrytis cinerea* [**37**, p. 315] accounted for 97% of all the isolates in 1956 and 80% in 1957. There is some doubt as to how the pathogens enter the fruit in the absence of visible lesions, but it is possible that excessive water absorption in rainy weather causes minute growth cracks.

Stemphylium consortiale was as prevalent as *P. herbarum* on tomato fruit, but was shown to be non-pathogenic in the field and at best a weak pathogen in the laboratory.

Jones (J. P.). **The relation of certain environmental factors, Tobacco mosaic virus strains, and sugar concentration to the blotchy ripening disease of Tomato and the inheritance of the tendency to the disease.**—*Diss. Abstr.*, **19**, 4, pp. 650–651, 1958.

From varietal trials at Ohio State University it was inferred that considerable differences in susceptibility and resistance to blotchy ripening [cf. **37**, p. 633] existed. The var. Ponderosa was the probable source of the resistance possessed by several pink-fruited vars; the extreme susceptibility of Rutgers possibly resulted from the chance recombination of genes for susceptibility within 1 hybrid plant, Marglobe × J.T.D.

The incidence and severity of blotchy ripening were much lower on hybrids of strain A Globe from various susceptible vars. than on the susceptible parents. Tobacco mosaic virus infection can increase incidence and severity but the disease can be severe on plants free from the virus. The combination of shade, high N, and high soil moisture increased both incidence and severity, and by subjecting plants to these conditions, which cause the development of succulent plants, the disease could be produced consistently at will. Hence a breeding programme utilizing strain A Globe for the development of a resistant red-fruited tomato var. would now be justifiable. A sugar deficiency in the fruit of diseased plants was detected.

Forest disease research.—*Rep. Pacif. Northw. For. Exp. Sta., 1958*, pp. 69–74, 2 fig., 1 graph, 1959.

Application of fresh pine sawdust to nursery soil at 100–200 cu. yd./acre controlled damping-off [cf. **35**, p. 797] and incidence of *Fusarium* on Ponderosa pine, increasing germination and decreasing mortality: the numbers of seedlings/sq. ft. were: treated (3 stands), 100 cu. yd./acre, 25, 28, 31; 200 cu. yd., 30, 36, 36; untreated, 18, 23, 31. Captan [cf. **36**, p. 216] as a soil dust also reduced disease losses.

The conclusion that western hemlock [*Tsuga heterophylla*] could often survive in centres of root rot infection (*Poria weirii*) in which Douglas fir [*Pseudotsuga menziesii*: cf. **35**, p. 854] was largely or entirely destroyed was confirmed, but mountain hemlock [*T. mertensiana*] was highly susceptible. The spread of *Phytophthora* [*lateralis*] disease of Port Orford cedar [*Chamaecyparis lawsoniana*: **37**, p. 188; **38**, p. 231] into the natural range of the host continues. The percentage infection of scars of Douglas fir (45–57 years old) and western hemlock (61 years old) after thinning in one locality in W. Washington was 22 and 56, respectively.

Accumulated evidence indicates that needle blight infections by *Elytroderma*

[*deformans*: **37**, p. 121] on Ponderosa pine are perennial, and that most of them continue to kill the year-old foliage each spring until the affected twig dies; the current outbreak, as shown by increment cores on 200 mature trees, started in the early 1940's in at least 2 localities in eastern Oregon. Great damage to big leaf maple [*Acer macrophyllum*] caused by *Verticillium* wilt [**36**, p. 739] was recorded in 1957 and 1958 in most of W. Washington and N.W. Oregon: though few trees were killed, large parts of many crowns were destroyed. Some trees killed back to ground level in 1957 sprouted freely from the base the next year.

Eslyn (W. E.). **Radiographical determination of decay in living trees by means of the thulium X-ray unit.**—*For. Sci.*, **5**, 1, pp. 37–47, 2 fig., 4 graphs, 1959.

The technique for the use of the thulium X-ray unit [cf. **37**, p. 116] for indicating the presence of cavities and advanced decay, and its application to stands of silver maple (*Acer saccharinum*) in Iowa, is described. The portable unit was used successfully on trees up to 22 in. in diam. Comparison is made with previous methods of X-ray photography of timber [cf. **20**, p. 330].

Agnihothrudu (V.) & Barva (G. C. S.). **Kutilakesopsis, a new genus of Tuberculariaceae from north east India.**—*J. Indian bot. Soc.*, **36**, 3, pp. 306–311, 12 fig., 1958.

The new sp. described, *K. macalpineae*, was growing on stem pieces of *Albizzia richardiana* from a tea estate in W. Bengal. The fungus closely resembles the genus *Kutilakesa* Subramanian [**36**, p. 426] in possessing characteristically undulate or loosely spiral, sterile brown verrucose setae, but differs in being always sessile and erumpent, with irregularly ramose conidiophores and typically didymosporous conidia.

Toole (E. R.) & Broadfoot (W. M.). **Sweetgum blight as related to alluvial soils of the Mississippi river floodplain.**—*For. Sci.*, **5**, 1, pp. 2–9, 3 fig., 2 graphs, 1 map, 1959.

Blight disease indexes, determined for stands of sweetgum (*Liquidambar styraciflua*) [cf. **36**, p. 674] grown on slack-water and natural levee soils of the lower Mississippi river floodplain, were 2·2 and 1·2, respectively. Blight increased with increasing K and Na content of soil samples at the 1–2 and 2–3 ft. levels, respectively; with the increase of imbibitional water in the 0–1 and 1–2 ft. levels; and with the decrease in bulk density in the surface 1 ft. It is probable, however, that factors restricting the availability of water are important in the blight complex only under conditions of deficient rainfall or excessive drainage, but the possibility that these factors act indirectly on blight through a yet undiscovered pathogen is not completely excluded.

Fresa (R.). **La presencia de Sphaceloma meliae en el 'paraíso' (Melia azedarach).** [The presence of *S. meliae* in the Beadtree (*M. azedarach*).]—*Rev. Invest. agríc., B. Aires*, **12**, 4, pp. 409–412, 7 fig., 1958.

S. meliae is reported for the 1st time in Argentina, causing leaf spots and branch lesions.

Golfari (L.). **Condiciones ecológicas del cultivo de las Salicáceas en la Argentina.** [Ecological conditions for the cultivation of Salicaceae in Argentina.]—*Rev. Invest. agríc., B. Aires*, **12**, 2, 1958. [*Biol. Abstr.*, **33**, 5, p. 1351, 1959.]

Salicaceae are extensively cultivated in the Paraná delta and in the irrigated sections of the Río Negro and Mendoza. Poplars in the delta, of which the most frequent are the new Euramerican hybrids of European origin such as *Populus* × *euramericana* cultivated vars. I–154 and I–214, are gradually declining after having

grown excellently for several yr. It is presumed that this is due to soil or climatic conditions which make them more susceptible to *Septoria* [*Mycosphaerella populorum*: **25**, p. 16]. A clone of *P. deltoides* var. *carolinensis*, introduced from Europe at an early date and quite well adapted to local conditions, is immune from *M. populorum*, but rather susceptible to *Melamspora* [**33**, p. 773]. Genetic improvement is needed to make it really suited to local conditions.

Itô (K.) & Kobayashi (T.). **Studies on some anthracnoses of woody plants.—V. Anthracnose fungi of Black Locust.**—*Bull. For. Exp. Sta. Meguro* 108, 29 pp., 6 pl., 4 fig., 4 graphs, 1958. [Japanese summary.]

Of 3 spp. of fungi causing anthracnose of black locust (*Robinia pseudoacacia*) in Japan the commonest, found on seedlings, saplings, and mature trees, was *Gloeosporium revolutum*, the perithecial and *Colletotrichum* states of which were found and are here described as *Guignardia robiniae* Ito & Kobayashi: conidia 10–15 × 2–5 μ, straight, perithecia 76–105 × 113–168 μ, asci 36–50 × 8–11 μ, and ascospores 10–15 × 4–5 μ. *C. destructivum* [**33**, p. 637] was found only rarely; *C. glycines* [loc. cit.] severely attacked black locust seedlings. *G. robiniae* infected *Lespedeza bicolor* var. *japonica*, bean (*Phaseolus vulgaris*), and *Amorpha fruticosa* in inoculation tests, but not soybean; *C. destructivum* attacked all these hosts; *C. glycines* attacked all except bean.

Ragonese (A. E.) & Rial Alberti (F.). **Mejoramiento de Sauces en la República Argentina.** [Improvement of Willows in the Argentine Republic.]—*Rev. Invest. agríc., B. Aires*, **12**, 2, pp. 225–246, 1 fig., 12 pl., 1958. [95 ref.]

In this report from the Instituto de Botánica Agrícola del Instituto Nacional de Tecnología Agropecuaria of progress in the programme for the improvement of commercially important willows (*Salix* spp.) it is stated that some hybrids have maintained resistance to, *inter alia*, anthracnose (*Marssonina salicicola* and *M. kriegeriana*) [**33**, p. 455] under natural conditions over a number of years.

Ark (P. A.) & Bell (M. R.). **Walnut blast, a new bacterial disease of Walnut.**—*Plant Dis. Reptr*, **43**, 2, pp. 272–275, 4 fig., 1959.

From the University of California, Berkeley, a disease of *Juglans mandchurica* and English walnut (var. Payne) caused by *Pseudomonas syringae*, is described, apparently for the 1st time. The organism causes a blasting of the nutlets and various degrees of spotting on the leaves. Lesions were produced in a number of hosts by needle inoculations and by spraying (cowpea and almond) with isolates from both walnuts; the lesions were identical with those induced by authentic cultures of *P. syringae* isolated from recognized diseases induced by this pathogen. On Payne walnut the bacterium was also associated with *Xanthomonas juglandis* [**35**, p. 496].

Serr (E. F.). **Blackline in Walnut.**—*Calif. Agric.*, **13**, 3, pp. 8–9, 14–15, 5 fig., 3 graphs, 1 map, 1959.

This disease [**38**, p. 38] is stated to be causing increasing losses of individual trees and even the abandonment of entire mature orchards in the walnut-producing areas adjacent to San Francisco Bay. It first makes its appearance when the trees are in full production and growth has slowed down, and ends in the death of the *Juglans regia* tops, with vigorous development of shoots from the rootstock. Once a black line has made its appearance at a union it advances round it at about 3 in./yr. In California the disease is most common on trees grown on *J.* [*californica* var.] *hindsii*, but occurs with other rootstocks also. In trees with several graft unions the condition is first seen 6–8 yr. later than in trees with only 1 union. Trunks not

exceeding 18 in. diam. or limbs topworked high where they will receive good light can be successfully regrafted.

When sprouting from the rootstock indicates the onset of the disease all unions can be examined by making small V-shaped cuts through the bark and cambium at intervals of about 4 in., and the extent of any girdling present may be marked. Plot maps can then be made of the distribution of affected trees and a salvage campaign planned, to be put into operation as soon as the disease becomes sufficiently serious. For replanting or interplanting, vigorous Paradox hybrids can be used, except where the oak root fungus [? *Armillaria mellea*: loc. cit.] is present, when vigorous *J. c.* var. *hindsii* seedlings can be planted.

Richter (H.) & Gerlach (W.). **Über die Typus-Art der Gattung Cylindrocarpon Wr und ihre Nectria Hauptfruchtform.** [Concerning the type species of the genus *Cylindrocarpon* and its *Nectria* perfect state.]—*Tijdschr. PlZiekt.*, **64**, 5–6 (Van Slogteren Nummer), pp. 392–395, 1 pl., 1 fig., 1958. [Dutch summary.]

When a branch of *Abies alba*, bearing a witches' broom caused by *Melampsorella caryophyllacearum*, was kept in a moist chamber at the Institut für Mykologie, Berlin-Dahlem, sporodochia of *C. cylindroides* developed within a few days, and some months later its perfect state, *N. cucurbitula* var. *macrospora* [cf. **10**, p. 626].

Takai (S.). **Nutritional studies on Cercospora cryptomeriae Shirai causing the needle blight of Cryptomeria japonica.**—*Bull. For. Exp. Sta. Meguro* 111, pp. 43–50, 5 graphs, 1959. [Japanese. Abs. from English summary.]

The best C sources for mycelial growth of *Cercospora cryptomeriae* [cf. **34**, p. 415] were maltose, D-glucose, and raffinose, and the best N sources $Ca(NO_3)_2$, $(NH_4)_2HPO_4$, and, of the amino acids tested, DC-tyrosine; complete glucose consumption and max. growth were attained more rapidly with $NaNO_3$ than with $(NH_4)_2HPO_4$. Glucose consumption and mycelial growth were parallel in both cases.

Sato (K.) & Shoji (T.). **Sclerotial root-rot of coniferous seedlings caused by Sclerotium bataticola Taub.**—*Bull. For. Exp. Sta. Meguro* 111, pp. 51–72, 4 pl., 3 graphs, 1959. [Japanese. Abs. from English summary.]

Sclerotial root-rot of seedlings of various tree spp. caused by *S. bataticola* [*Macrophomina phaseoli*: **21**, p. 275] is very common in nurseries and sea-shore and sand protection forests throughout Japan. Infection takes place in the summer and early autumn, the first symptoms being a gradual loss of colour in the needles. Stems are generally attacked at soil level, the damage spreading to the roots. Infected tissue turns reddish brown and numerous black sclerotia may develop, but the authors have never observed pycnidia on the plants. In pathogenicity tests at the Akita Branch Station *M. phaseoli* infected *Pinus densiflora* and *Cryptomeria japonica* seedlings, caused charcoal rot of *Phaseolus angularis* and soybean, and black rot of sweet potatoes; 14 spp. in 6 families are listed as host trees in Japan.

The fungus grew vigorously on potato decoction agar and Saito's soy agar at 10–38° C., 35° being favourable. Infection of Japanese larch (*Larix leptolepis*) and *Phaseolus vulgaris* was severe in soil maintained at 30° whereas seedlings in the open air were not damaged. Dry soil favoured the development of the disease in *L. leptolepis*; application of slaked lime noticeably reduced infection but the addition of HCl did not seem to affect it. Of various fungicides tested by a modification of Zentmyer's method undiluted pyroligneous acid [**38**, p. 342] and aqueous solutions of formalin, glacial acetic acid, and vapam killed fungal disks at a depth of 2·5 cm.

Schutt (P.). **Züchtung mit Kiefern. II. Kreuzungen, Resistenzzüchtung, und Zytologie.** [Breeding with Pines. II. Crossing, breeding for resistance, and cytology.]—*Mitt. Forsch Anst. Forst- u. Holzw.* (formerly *Mitt. Reichinst Forst.- u. Holzw.*) 42, 40 pp., 4 graphs, 1959. [Over 200 ref.]

A detailed review of the literature on pine breeding for performance and resistance to diseases, including *Cronartium ribicola*, *Peridermium pini*, *Melampsora pinitorqua*, *Lophodermium pinastri*, and *Phytophthora cinnamomi* [cf. **38**, p. 282].

McMinn (R. G.) & Molnar (A. C.). **Further observations on pole blight and climate.** —*Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.*, **15**, 1, pp. 2–3, 1 graph, 1959.

Observations in British Columbia as to a possible correlation between a lessening of pole blight of western white pine [*Pinus monticola*: cf. **38**, p. 104] over recent years and climatic conditions indicate that cool, wet summers have exceeded hot, dry ones since 1946, in contrast to a majority of hotter drier ones previously, especially in 1930–40. Non-observance of much recovery before 1953 may have been due to the fact that decline had reached an advanced stage, preceding conditions having induced considerable root rot, accompanied sometimes by the effects of 2ndry parasites such as *Armillaria mellea*. Such trees may also be more sensitive to the periodic hotter and drier years in an otherwise cool and moist cycle. The observations support the theory that pole blight is a concomitant of the hot, dry part of a climatic cycle.

Nordin (V. J.). **Basal fire scars and the occurrence of decay in Lodgepole Pine.**— *For. Chron.*, **34**, 3, pp. 257–265, 7 fig., 1 graph, 1 map, 1958.

Of the trees examined in 85-year-old stands of lodgepole pine [*Pinus contorta* var. *latifolia*] at Nordegg, Strachan, and Water Valley, Alberta, 86% had 33–39-yr.-old basal fire scars [cf. **37**, p. 687]. The percentage infection of these was correlated with the size of the scars and averaged 17 in Water Valley, 35 and 41 in Strachan, and 56 and 84 in Nordegg. The fungi entering the scars were identified as follows: associated with firm red stain, *Stereum pini* (27%), *Polyporus anceps*, *S. sanguinolentum*, *Fomes pini*, and *S. pini* (12%), and non-Basidiomycetes (43%); *Coniophora puteana* causing brown cubical decay (2%); *Polystictus abietinus* causing white pitted decay (12%); and non-Basidiomycetes causing blue stain (4%). In the light of these data suggestions are made concerning the management of lodgepole pine locally.

Klyushnik (P. I.). Больше внимания борьбе с корневои губкои Сосны. [More attention to the control of root fungi of Pine.]—Лесн. Хоз. [*Lesn. Khoz.*], *1958*, 9, pp. 38–40, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 7, p. 202, 1959.]

Primary infection of pine by [unspecified] root fungi derives from stumps, mainly from the first felling, and increases when the forests are further thinned. Thin stumps should be uprooted by machine or, in dense plantations, by the hand device RK-1 (or R-2); otherwise they should be treated immediately with 4:1 naphtha-creosote.

Van der Westhuizen (G. C. A.). **Studies of wood-rotting fungi: I. Cultural characteristics of some common species.**—*Bothalia*, **7**, 1, pp. 83–99, 5 pl. (32 fig.), 1958.

The cultural characters of 16 spp. of wood-rotting fungi are described together with their key patterns [cf. **28**, p. 201] for diagnostic purposes; the characters of some of the South African spp. are described for the first time.

Included are *Amauroderma rude* reported to cause decay of stumps and roots of

Acacia mollissima; *Coniophora arida* (probably only a form of *C. puteana*) causing brown rot of conifers; *Ganoderma colossum* responsible for extensive collar rot of *Pinus hondurensis* and *Callitris robusta* in Natal; and *Lenzites palisoti* a very common cause of white rot of timber in use.

Walters (C. S.). **Problems and practices in wood preservation, 1957–58.**—*For. Prod. J.*, **9**, 2, pp. 43–49, 5 fig., 1959. [127 ref.]

Advances in methodology and materials, research in progress, activities of various related societies, and items of general interest are presented. Equipment for analyzing samples of wood treated with pentachlorophenol [**37**, p. 607], installed by the Monsanto Chemical Co. and the Dow Chemical Co., is mentioned. This enables the amount of this preservative in wood to be determined in 3 min. by X-ray spectrograph. The D-1413 56T tentative standard adopted in 1956 for the soil-block method [**38**, p. 168] for accelerated laboratory testing of preservative chemicals was approved in 1957 without change.

Bruk (A. S.). **Proofing building board against biological attack.**—*Pap. Industry, Moscow*, **33**, 9, pp. 13–14, 1958. [Russian. Abs. in *Bull. Inst. Pap. Chem.*, **29**, 8, pp. 1160–1161, 1959.]

Sodium silico-fluoride ($NaSiF_6$), anthracene oil, C_6H_5 phenol, pentachlorophenol, basic copper arsenate ($Cu\ HAsO_4$), and basic zinc arsenate ($ZnHAsO_4$) were added as solutions or emulsions to the wood-fibre slurry (usually in the headbox) at concs. of 1–5% on the basis of fibre weight. They did not affect the mechanical properties of the board [cf. **38**, p. 434] and, except for $NaSiF_6$, conferred adequate protection against *Coniophora cerebella* [*C. puteana*]. To ensure comparable results with the highly soluble $NaSiF_6$ it must be used at 7%, while the tendency of the compound to increase the water absorbing power of the board is an added disadvantage. The optimum conc. for the other preservatives were as follows: C_6H_5 phenol 1%, pentachlorophenol 3%, anthracene oil 5%, $CuHAsO_4$ 3%, and $ZnHAsO_4$ 2%.

Nelson (M. R.). **Studies on the ringspot disease of crucifers and its incitant Mycosphaerella brassicicola (Fr.) Lindau.**—*Diss. Abstr.*, **19**, 4, p. 627, 1958.

Ringspot of crucifers [**31**, p. 96] has long been known to occur exclusively in the Pacific coastal areas in the U.S.A. but the reasons for this were not known. At the University of Wisconsin adequate and consistent infection was obtained by using a finely ground agar grown mycelium, the agar being an excellent sticker, which was important as the fungus penetrates slowly. Moist conditions for 6 or more days after inoculation were required for good infection, as little penetration occurred before this.

The disease developed most rapidly at 20° C., when plants at first often had several times as many lesions as at 16°, but more infection was ultimately produced at 16°; a little infection was also secured at 12°, 24°, and 28°. Plants kept at 28° for 16 hr. and at 16° for the remaining 8 hr. of each day were considerably more infected than those kept continuously at 28°. Perithecial formation, ascospore maturation, and spore ejection all proceeded best at 16° and 20°. Few spores were formed at 24° and none at 28°, but they were produced at both 12° and 8° in decreasing rates and quantities with decreasing temp. Before perithecia will develop lesions must be exposed to moisture conditions of near saturation for a min. of 4 days. Under opt. conditions of moisture and temp. mature spores were formed in 7 days.

Low and high levels of balanced nutrient solutions (0·25 and 3 Hoagland) promoted little disease in comparison with 1 H. Modified 1 H with sub-opt. N or P gave higher infection levels than 1 H. Low P resulted in much less disease than balanced 1 H.

Palm (E. T.). **Effect of mineral nutrition on invasiveness of Plasmodiophora brassicae Wor. and development of clubroot.**—*Diss. Abstr.*, **19**, 3, pp. 425–426, 1958.

At Oregon State College Ca at <40 mg./l. nutrient solution stimulated initial infection of Shogoin turnip plants by *P. brassicae* [cf. **37**, p. 746], while higher concs. were inhibitory. The development of clubbed roots was stimulated by increasing Ca up to 100 mg./l. High B increased the inhibitory action of Ca. In a field experiment hydrated lime at 4,000 lb./acre gave better control than 1,000 lb., while 250 lb. actually stimulated the disease. With lime at 250 lb., B up to 50 lb./acre increased the percentage of healthy plants. As little as 2 mg.B/l. nutrient solution markedly reduced initial infection. Both initial infection and club development were stimulated by increasing K, which was not inhibitory even at 300 mg./l. There was more K in the clubs than in the rest of the plant or in healthy plants. Acid conditions were best for both initial infection and club development. Be, Li, Cs, Ba, Rb, and Sr, in that order of effectiveness, inhibited initial infection, and all except Sr did so at very low concs.

Rosser (W. R.). **Fungicidal control of club root.**—*Plant Path.*, **8**, 1, pp. 13–15, 1959.

In a trial at the National Agricultural Advisory Service, Wolverhampton, on land heavily infected by club root [*Plasmodiophora brassicae*: cf. **36**, p. 742; **38**, p. 43 and above] pentachloronitrobenzene (PCNB) dust was applied at rates equivalent to 30 and 60 lb./acre and tecnazene dust at 8 lb., both broadcast 13 days before planting with healthy cabbage plants on 26 June; alternatively, ½ pint of 1:2,000 $HgCl_2$ solution or of 1:320 PCNB solution was applied to the dibble holes. During the trial the soil was at pH 6 and the mean air temp. was 7–21° C. PCNB solution was lethal, and these plots were replanted on 1 Aug. At harvest on 2 Oct. the mean no. of healthy plants/plot of 17 for the 1st 4 treatments was, respectively, 3·13, 2·63, 2·38, and 6·63 compared with 1·88 for the control [cf. **35**, p. 255] and the numbers (out of a total of 136) with no club root were, respectively, 25, 21, 19, 53, and 15. The damage found on the roots of the replants suggested that the period of 35 days which elapsed between treatment and planting was insufficient, even in a very wet season, to remove all phytotoxicity, but 118 of the replants were disease-free.

Guttenberg (H. von) & Schmoller (H.). **Kulturversuche mit Peronospora brassica Gäum.** [Culture tests with *P. brassicae*.]—*Arch. Mikrobiol.*, **30**, 3, pp. 268–279, 11 fig., 1958.

At the Botanisches Institut, University of Rostock, Germany, spore suspensions from leaves of swedes infected by *P. brassicae* [*P. parasitica*: **37**, p. 428] infected the cotyledons of swede, turnip, and cabbage with the production of conidia in 4 days at greenhouse temp. circa 20° C. Radish and wild and white mustard were not infected. Crops of conidia were maintained by cutting up bundles of infected swede seedlings when the incubation period was almost completed, disinfecting for 1 min. with 0·2% $HgCl_2$ plus 0·1% saponin, and washing several times in sterile distilled water. In approx. 18 hr. at 16–18° they produced successive crops of abundant conidia.

The length of the conidial germ tube is dependent on the nutrient substratum. Development from conidium to mycelium was observed microscopically on swede shavings. Isolation of the mycelium was achieved from inoculations on swede slices, on which sexual and asexual reproductive organs were formed in the aerial mycelium in 3–4 weeks.

Limited mycelial growth was obtained in sap from swedes. Mycelial growth and fructification occurred on swede-decoction glucose agar, oatmeal agar, and rice

starch agar. On beer wort phosphate agar conidiophore formation occurred in the medium.

There was considerable [unspecified] variation in the form and size of the conidia and conidiophores.

CORBAZ (R.). **Le pied noir de la Betterave.** [Black leg of Beet.]—*Rev. rom. Agric.*, **15**, 3, pp. 27–29, 3 fig., 2 graphs, 1959.

In 1958 losses from black leg were exceptionally severe in French-speaking Switzerland. In an account of the disease, the fungi involved (*Phoma betae* and *Pythium* sp., especially *P. debaryanum* and *P. ultimum*), and control measures, the author states that in his experience *Phoma betae* and *Pythium* are encountered in almost equal proportions (cf. Braun & Riehm, [**32**, p. 493] who give 7:4 as the ratio). In an experiment in which disinfected seed was sown in steam-sterilized soil inoculated with the 3 spp. and *P. irregulare*, *P. ultimum* was by far the most virulent, killing most seedlings before emergence.

GALACH'YAN (R. M.). Туберкулез Свеклы в Армении. [Tubercle of Beet in Armenia.]—Микробиол. сб. АНАрмССР [*Microbiol. Sborn. Acad. Nauk Arm. S.S.R.*], *1958*, 9, pp. 139–155, 1958. [Armenian summary. Abs. in *Referat. Zh. Biol.*, *1959*, 7, p. 205, 1959.]

Xanthomonas beticola was observed for the 1st time on beet in Armenia, U.S.S.R., in the Arevashat, Échmiadzinski district, infecting 17–21% of the plants. Different strains varied in pathogenicity; those from table and fodder beets were also pathogenic to sugar beet.

REILING (T. P.). **Studies on virus diseases of canning Peas in Minnesota.**—*Diss. Abstr.*, **19**, 4, p. 628, 1958.

Two isolates of pea streak virus, I and II [**38**, pp. 173, 235], 1 isolate of pea stunt virus [cf. **37**, p. 748], and 3 isolates of pea mosaic virus, I, II, and III [**38**, p. 111] were studied at the University of Minnesota. Both streak isolates were capable of producing local lesions on *Gomphrena*, a reaction not previously described. Streak I was shown to consist of several different components. Physical properties of both isolates tended to resemble those of the American streak virus.

Mosaic isolates varied in symptom expression from a very severe chlorosis to a very mild mottle. Host range studies indicated that 2 of them were strains of bean mosaic virus 2.

Streak II and mosaic II moved to the growing point of inoculated plants within 3 days at 85° F., whereas at 65° the latter required 5 and the former 9 days, the faster virus recovery at the higher temp. being due to faster plant growth. Streak II required 3 days to move out of the inoculated leaflet and then it moved rapidly up and down. It was first detected after 36 hr. at 85°, 5 days being required at 65°. With streak I a mottle was first detected after 3 days at 85° and the streak complex after 5 days. Temp. of 85° hastened virus detection by at least 50% compared with 65°.

The earlier the stage of development when infection takes place the greater the reduction in yield. A mixture of streak I, pea stunt, and mosaic II resulted in a 13·5 % yield reduction in 1954, whereas in 1955 the earliest inoculation of streak I caused a 25% reduction. Inoculation at the 5–7 and 11–13 node stage reduced yields only slightly in comparison with non-inoculated.

TINSLEY (T. W.). **Pea leaf roll, a new virus disease of Legumes in England.**—*Plant Path.*, **8**, 1, pp. 17–18, 1 pl., 1959.

At Rothamsted Experimental Station farm, field and broad beans infected by pea leaf roll virus [**36**, p. 812] display a rolling and yellowing of the topmost leaves; later, the upper half of the plant usually has bright yellow, rolled leaves, which are

thick and brittle. The plants are stunted, defoliation occurs, and many growing points become necrotic. In peas, the symptoms are less severe. In the glasshouse symptoms appear in about a month; in broad beans they are very distinct, usually a green veinbanding; peas develop only a transient chlorosis, but are severely stunted. *Myzus persicae* and *Macrosiphum pisi* transmitted the virus when allowed to feed on infected plants for 3 days and on the test plants for 2.

In the field the yield of 25 naturally infected field bean plants was half that of healthy. In 1956 20% infection was recorded in a crop of field beans in Cambridge in the middle of Aug. Many crops of peas and beans in S.E. England were infected in 1955–7. Both at Rothamsted and at Cambridge attacks of chocolate spot (*Botrytis fabae*) were more severe on beans infected by leaf-roll virus than on healthy ones.

Roland (G.). **Note sur une mosaïque de la Févérole (Vicia faba).** [Note on a mosaic of the Broad Bean (*V. faba*).]—*Tijdschr. PlZiekt.*, **64**, 5–6 (Van Slogteren Nummer), pp. 396–398, 1958. [Dutch summary.]

Studies at the Station de Phytopathologie de l'Etat, Gembloux, on the transmission, serology, and properties of a virus from a mosaic of broad bean recorded for the 1st time in Belgium in 1955 showed it to be a variant of bean yellow mosaic virus, producing on *Phaseolus vulgaris* reddish necrotic spots along the veins of the youngest leaves, accompanied by interveinal yellowing and distortion of the lamina [cf. **32**, p. 663].

Nultsch (W.). **Ein Verfahren zur bakteriziden Beizmittelprüfung unter Verwendung von Pseudomonas phaseolicola (Burkh.) Dowson als Testorganismus.** [A procedure for testing bactericidal substances, using *P. phaseolicola* as test organism.]—*Zbl. Bakt.* Abt. 2, **111**, pp. 387–404, 1 pl., 1 fig., 1958.

In this method described from the Biologischen Institut des VEB Fahlberg-List, Magdeburg, Germany, bean [*Phaseolus vulgaris*] seed var. Mittelfrühe Riesen was inoculated with a suspension of *Pseudomonas* [*medicaginis* f.sp.] *phaseolicola* under vacuum (—12 mm. Hg ensuring penetration of the testa) [cf. **35**, p. 572], dried for 24 hr. before treatment with germisan, streptomycin, thiram, and experimental product K, and subsequently sown in the greenhouse. Results, based on inspection of the seedlings after 3 weeks, were in agreement with experience, streptomycin being the most effective.

Klein (H. H.). **Etiology of the Phytophthora disease of Soybeans.**—*Diss. Abstr.*, **19**, 4, p. 651, 1958.

The morphology of the *P.* sp. inciting the root and stem rot of soybean [**38**, p. 50] in Ohio and also the factors affecting it were investigated at Ohio State University. The recovery of the pathogen from field soil, as determined by a plant assay technique, was very low after the soil became dry but after prolonged wet conditions recovery was conspicuously higher. Viable *P.* was found in soil which was inadvertently included in seed samples at harvest. Some Harosoy plants in steamed soil became diseased after treatment with water from flooded diseased plants. The pathogen was isolated from immature seeds taken from pods within an advancing margin of stem rot and from stem lesions, also from seeds only after a 2 months cold-wet treatment.

Van Hoof (H. A.). **Oorzaak en bestrijding van de papiervlekkenziekte bij Prei.** [Cause and control of white spot disease of Leeks.]—*Tijdschr. PlZiekt.*, **65**, 2, pp. 37–43, 1 fig., 1959. [English summary.]

At the Instituut voor Plantenziektenkundig Onderzoek, Wageningen, a *Phytophthora* sp. isolated from diseased leeks in the Netherlands was found to be similar to

P. porri [map 204] but its conidial measurements on oatmeal agar (38·2×28·5 μ) were less than those given by Foister [**11**, p. 151] (51×35 μ) and its opt. temp. for growth in culture was 12–22° C. (max. 26°) [cf. **31**, p. 65]; also no conidia were formed on the leaves. Spraying 5 times at 3-weekly intervals with copper oxychloride, captan, or zineb gave fairly good control, disease indices (10 representing a disease-free crop and 1 heavy infection) on 20 Oct. being, respectively, 8+, 8—, and 8, compared with 5 for the unsprayed.

Van Hoof (H. A.). **Seed transmission of Lettuce mosaic virus in Lactuca serriola.**—*Tijdschr. PlZiekt.*, **65**, 2, pp. 44–46, 1959. [Dutch summary.]

This work at the Instituut voor Plantenziektenkundig Onderzoek, Wageningen, arose out of a report by Welch *et al.* (*West. Gr. & Shipp.* **24**, pp. 80–86, 1953) [cf. **32**, p. 533] that *Lactuca serriola* did not transmit lettuce mosaic virus by seed, so that breeding work was envisaged to incorporate this factor into other lettuce vars. However, tests with *L. serriola* seed from a number of European sources demonstrated transmission of the virus in all, though the level of transmission varied from 0·2–50%.

Canova (A.). **L'imbianchimento nervale dell'Insalata.** [Big vein of Lettuce.]—*Ital. agric.*, **95**, 8, pp. 479–482, 2 fig., 1958.

An account is given of the symptoms and control by root disinfection with substances containing hormones of big vein disease of lettuce [cf. **38**, p. 441], which the author considers to be due to a virus. The disease was observed in the Romagna in the summer of 1956, this being apparently the 1st record for Italy. Only 5–6% of the plants were affected, and the condition was quickly brought under control.

Graniti (A.). **Tentativi di lotta contro il marciume del colletto della Lattuga.** [Attempts at the control of collar rot of Lettuce.]—*Ital. agric.*, **95**, 8, pp. 493–501, 7 fig., 4 graphs, 1958. [39 ref.]

Trocadero lettuces growing at Molfetta were treated against collar rot caused by *Sclerotinia* spp. and *Botrytis* spp., 2 months after planting and as the first symptoms of the disease were becoming apparent, by pouring 500 ml. of a 0·5% solution of terraclor 75 (75% pentachloronitrobenzene) round each plant or using it as a dust at 3·2 g./sq. m. Another plot was treated at about ½-rate. At picking on 24 Apr. the average infection for the full rate was 20·2% and for the ½ rate 14·1%, as against 37 and 34·1% in the untreated.

Cook (A. A.) & Anderson (C. W.). **Multiple virus disease resistance in a strain of Capsicum annuum.**—*Phytopathology*, **49**, 4, pp. 198–201, 2 fig., 1959.

At the University of Florida, Gainesville, strain P 11 of *C. annuum* was found to be hypersensitive to 3 of 4 strains of tobacco mosaic, tolerant of 5 of 7 of tobacco etch, and unaffected by all 5 potato virus Y strains tested by mechanical and graft inoculation [cf. **38**, p. 441]. Movement of potato Y through P 11 stems was demonstrated by graft inoculations, but these gave no indication of multiplication of the virus in the plants. The reactions of *C. frutescens* var. Tabasco to TMV [cf. **14**, p. 126] and of *C. annuum* var. S.C. 46252 to tobacco etch [cf. **36**, p. 297] and potato virus Y are compared. P 11 proved susceptible to lucerne mosaic, cucumber mosaic [**37**, p. 693], and aster [tobacco] ring spot viruses.

Clare (B. G.). **The identity of the Cucurbit powdery mildew of south-eastern Queensland.**—*Aust. J. Sci.*, **20**, 9, pp. 273–274, 1958.

The taxonomic status of the powdery mildews of cucurbits, *Erysiphe cichoracearum* and *Sphaerotheca fuliginea*, is discussed in relation to the confusion arising from the close similarity of their imperfect states and the rare development of the perfect

state. All the specimens examined at the Dept of Botany, University of Queensland, Brisbane, formed conidia with well-developed fibrosin bodies [**16**, p. 632] and the hyphae lacked the appressoria characteristic of *E. cichoracearum*. Moreover, the conidial dimensions (25–46·5 × 14–25 μ) agreed with those of *S. fuliginea* [**4**, p. 315], to which the pathogen is accordingly referred. Its hosts are melon [cf. **38**, p. 115], cucumber, squash, vegetable marrow, and *Sechium edule*.

Mildews morphologically indistinguishable from *S. fuliginea* have been observed locally on *Verbena bonariensis*, *V. hybrida*, *Euphorbia hirta*, and *Hypochaeris microcephala* var. *albiflora*. *S. fuliginea* has not been recorded on these plants elsewhere, and in the absence of perithecia positive identification is impracticable. Neither *E. hirta* nor *H. microcephala* var. *albiflora* has hitherto been listed as a host of mildew in Australia.

Ochs (Gertrud). **Untersuchungen und experimentelle Versuche über die Sortenanfälligkeit von Reben gegen Viruskrankheiten.** [Studies and experimental trials on the varietal susceptibility of Vines to virus diseases.]—*Mitt. [bot. VersLab.] Klosterneub.*, Ser. A, **8**, pp. 313–318, 1958. [English, French, and Spanish summaries. 30 ref.]

The differential reactions of a number of vine vars. commonly cultivated in Germany to the 3 viruses recently described by the author [**37**, p. 755] were reflected in the different lengths of their latent periods, but all are equally susceptible and no resistance was found. At the conclusion of the latent period many American vars. affected by 'panachure' [**38**, p. 443] or by 'jaune canare' give only non-specific reactions, contrary to all the European ones.

Casarini (B.) & Antoniani (C.). **La durata del periodo di incubazione della Plasmopara viticola nel periodo estivo-autumnale.** [The duration of the incubation period of *P. viticola* in the summer-autumn period.]—*Atti Accad. Sci. Ist. Bologna*, Ser. XI, **5**, pp. 117–126, 10 graphs, 1958.

From 11 July until the end of the growth period (31 Oct.) 1-yr.-old vines of 5 vars. were inoculated with a sporangial suspension of *P. viticola* every few days; afterwards 42 of these infections were submitted to either 81–97% or nearly 100% R.H., 38 being kept at natural air humidity (about 41–96% R.H.). With few exceptions, when the inoculations were made on the same date and the sporangia had developed at about the same atmospheric temp., the incubation period was 1 day less at high R.H. than at low. This held when the average difference between the two was 30% (July), 35% (Aug.), 37% (1st half of Sept.), or 24% (2nd half of Sept.).

In the 1st half of Nov. the incubation period at the ambient humidity, which was usually over 80%, was often some days longer than at very high or max. humidity; temp. may possibly have played some part in this. The evidence from these and other experiments indicates that as the year advances the incubation period of *P. viticola* shortens.

Petrukhina (Mme M. T.). Опыт борьбы с мильдью по инкубационным периодам. [Test for the control of mildew in the incubation period.]—*Vitic. & Wine-Mak., Moscow*, **18**, 4, pp. 27–29, 2 graphs, 1958.

In the Beregovski vineyards, Moladavian S.S.R., in 1955, Traminer and Bakator vines were used for testing the incubation period of mildew [*Plasmopara viticola*: **38**, p. 443; cf. above and below]. During 1 May–1 Oct. there were 63 rainy days and the 1st infection theoretically should have occurred on the 16 May, when the calculating of the incubation periods started. There were 18 up to 25 Sept. During some incubation periods (25 May, 18 June, 3 and 15 July) 1% Bordeaux mixture was used whereas before flowering the conc. was 3%. The best control was obtained

when 2 additional sprays were given, the 1st 10 days before flowering and the 2nd a few days before the 1st possible infection; this increased yield by 43·6 centner/ha. over the vines given 4 sprays. In 1956, when atmospheric conditions were unfavourable for the disease, 3–4 sprayings in alternate incubation periods proved adequate for control.

Oltarzhevskiĭ (N. P.). О профилактических мероприятиях против мильдью Виноградной Лозы. [On prophylactic measures against Vine mildew.]—*Vitic. & Wine-Mak., Moscow*, **18**, 4, pp. 29–31, 1958.

Investigations by the Middle Asian Research Station VIR, U.S.S.R., in 19 regions with considerable vine-growing industry showed that where the R.H. in May–Aug. was 65–70% or higher, and with only a slight fluctuation between day and night temp. (8–12° [C.]), the incidence of mildew [*Plasmopara viticola*: see above] was highest because of abundant dew formation. But where the fluctuation was 15–18° incidence was lowest. The author considers that a check on the incubation periods [loc. cit.] before spraying cannot be applied in all districts and is often inexact. In taking prophylactic measures against the disease, the effectiveness of the compound used and the thoroughness of application are more important than the number of sprays.

Zubov (M. F.). Препарат цинковой соли этиленбисдитиокарбаминовой кислоты–новый эффективный фунгисид против милдью. [The compound zinc ethylenebisdithiocarbamate—a new effective fungicide against mildew.]—*Vitic. & Wine-Mak., Moscow*, **18**, 7, pp. 36–38, 1958.

In 1957 zineb was used at over 40 agricultural research stations in U.S.S.R. against vine mildew [*Plasmopara viticola*: cf. above and below]. In all tests the control given by 50% zineb at 0·5–0·75% was the same as for 1–4% Bordeaux mixture or better.

Kochenko (Z. I.). Результаты испытания 50%-ной цинковой соли этиленбисдитиокарбаминовой кислоты в борьбе с милдью. [The results of tests with 50% zinc ethylenebisdithiocarbamate for mildew control.]—*Vitic. & Wine-Mak., Moscow*, **18**, 7, pp. 38–39, 1958.

At the Nizhneprovski Scientific Research Station 3 applications (30–31 May, 24 June, and 31 July, 1957) of 50% zineb at 0·5% on Shasla vine gave the same control of mildew [*Plasmopara viticola*: see above], calculated as the number of infected leaves and the intensity of infection, as 1% Bordeaux mixture. In laboratory tests with detached leaves of 5 vine vas. zineb also proved very effective.

Gargiulo (A. A.). **Efectos secundarios de productos cúpricos y acúpricos utilizados para controlar Plasmopara viticola.** [Secondary effects of copper and non-copper products used to control *P. viticola*.]—*Rev. Invest. agríc., B. Aires*, **12**, 4, pp. 379–395, 1 fig., 2 graphs, 1958. [45 ref.]

In plot trials run by the Escuela de Agricultura de General Alvear, Universidad Nacional de Cuyo, 75% zineb at 350 g./ha. and 50% captan [cf. **36**, p. 85] at 250 g. mixed with the 2nd to 7th sulphur sprays gave significantly higher yields (4·295 and 4·545 kg./plant) than the unsprayed (3·505) or those given Bordeaux mixture (3·5225); maneb was intermediate. *Oidium* [*Uncinula necator*] was prevented by dusting with S. There were no phytotoxic symptoms with non copper products, but some damage with Bordeaux.

Schreier (O.). **Das Auftreten wichtiger Schadensursachen an Kulturpflanzen in Österreich im Jahre 1958.** [The occurrence of important causes of injury to

cultivated plants in Austria in the year 1958.]—*PflSchBer.*, **22**, 4–5, pp. 53–60, 1959. [English summary.]

In this list of diseases [cf. **38**, p. 542] *Cylindrocarpon radicicola* on cyclamen, *Physalospora obtusa* on apple, and celery mosaic virus on celery are reported for the 1st time in Austria.

De Robertis (A.). **Indagini ed experienze fitopatologiche durante il decennio 1947–1956. (Guida di fitopatologia speciale meridionale.)** [Phytopathological researches and experiments during the decennium 1947–56. (A guide to the special phytopathology of the south.)]—*Relaz. Attiv. decenn. Staz. agr. speriment. Bari 1947–56*, pp. 101–140, 20 fig., 1957. [Received Mar. 1959.]

In this report on plant pests and diseases which are of special importance in S. Italy and on control methods particularly applicable in the area the author deals, *inter alia*, with olive decline (*Gloeosporium olivarum*) [cf. **34**, p. 380; **36**, p. 6 *et passim*] associated with leaf infection by *Cercospora cladosporioides* [cf. **36**, p. 574], the latter not previously reported from Apulia; lettuce anthracnose (*Marssonina panattoniana*) [cf. **37**, p. 16], also present on chicory [cf. **36**, p. 574]; vine excoriosis (*Phoma flaccida*) [cf. **36**, p. 635], apparently not before reported from S. Italy; celery late blight (*Septoria apii*) [cf. **37**, p. 16]; dry wilt of almond branches, caused by *Fusicoccum amygdali* [cf. **36**, p. 411]; and bacteriosis (*Bacillus carotovorus*) [*Erwinia carotovora*] of fennel [*Foeniculum vulgare*], the last 2 not previously reported from Apulia.

Abstracts of papers concerning horticulture, plant pathology and pest investigations of the annual meeting of the Agricultural Research Centre in 1958.—*Maataloust. Aikakausk.*, **30**, pp. 199–210, 1958.

In a contribution (pp. 203–4) on varietal trials with greenhouse tomatoes, K. Salokangas, Dept of Horticulture, Piikkio, Finland, reported that a Weibulls var. Immuna F_1 hybrid proved to be fully resistant to *Cladosporium fulvum* [cf. **36**, p. 7]; it was also earlier and higher-yielding than Potentate A.H.8, the standard var.

Concerning the control of *Botrytis cinerea* on strawberries, E. Tapio, Tikkurila, gave an account of experiments made in 1955–57. Captan preparations (flit 406, orthocide 50, orthocide 10P) and a thiram preparation (pomarsol forte) gave the most effective control, reducing infection by 13 and 13·4% respectively (average infection of untreated plants 24·5%). Captan gave a 37% increase in the average yield and did not appreciably affect the flavour of fresh fruits, thiram gave 15%, but caused some deterioration, and griseofulvin gave a slight yield increase but caused considerable off-flavour. Actidione gave a 28% increase. On thawing deep-frozen strawberries, *Rhizopus* sp. attacked 11·4% of those treated with captan, 10·9% of thiram-treated, and 22·2% of untreated. The flavour and external appearance of strawberry preserves and bottled fruit was impaired by captan, but not by thiram; griseofulvin somewhat spoilt the flavour and external appearance of bottled fruit, but not of preserves. A. Ylimakai, Tikkurila, reported (p. 210) some control of potato scab (*Streptomyces* sp.) with 100–150 g. active pentachloronitrobenzene/are; double this amount reduced scab by 25–30% and also *Rhizoctonia* [*Corticium*] *solani*. Though suitable for gardens, such treatment is not economic in the field.

Hopkins (J. C. F.). **Plant diseases in the British Colonial Dependencies.**—*F.A.O. Pl. Prot. Bull.*, **7**, 2, pp. 19–20, 1958.

Information not already noticed includes a new disease of sorghum in Nigeria, characterized by small, spherical and elongated galls on the leaf veins, accompanied by a shortening of the stem internodes causing dwarfing. Experimental transmission has not yet been effected. In Nyasaland strong circumstantial evidence

was obtained that *Colletotrichum tabacum* [**37**, p. 185] was imported into the country on tobacco seed from S. Rhodesia [**38**, p. 295]; in Tanganyika [**38**, p. 382] it is at present confined to Urambo and Chuaya. *Septomyxa affinis* was unusually destructive in tobacco seed-beds in Nyasaland [**37**, p. 134], even causing total loss; stem-pitting disease of coffee was found on bushes imported from Tanganyika [**38**, p. 381] 3 years previously, which were destroyed.

A swollen shoot type of virus was recorded on cacao from Gandorhun, Sierra Leone. It causes vein chlorosis but no swelling of the shoot; affected trees are reported to be bearing heavily.

Wheeler (B. E. J.). **A plant disease survey of Malta.**—30 pp., Dept of Information, Malta, [? 1958. Multilithed.] 6*d*.

This survey was made Jan.–July 1957. An introduction is followed by an annotated list of plant diseases, under crops, in alphabetical order of their Latin names, a list of pathogens and physiological disorders, and an index of English and Maltese vernacular names. The 3rd part deals with pathological problems in Malta, with notes on potato blight (*Phytophthora infestans*), one of the most important diseases in the Island and normally prevalent on the winter crop, and tomato diseases, including blight (*P. infestans*), a wilt (*Fusarium* sp.), and cucumber mosaic, the only definitely established virus disease of tomatoes. Of the citrus diseases, die-back [**29**, p. 203] (mainly caused by high wind), gummosis with which *Diplodia natalensis* and *Phytophthora* spp. are associated, and fruit rots are noted. Pear scab (*Venturia pirina*) [loc. cit.] occurring on the 'bambinella' type of pear is one of the outstanding fruit tree diseases, while peach leaf curl (*Taphrina deformans*) is widespread throughout the Island. Of the vegetable diseases, onion downy mildew (*Peronospora destructor*) is particularly troublesome, and is accompanied by secondary infection, mainly by the conidial state of *Pleospora herbarum*. Infected flower stalks weaken and are frequently broken by the wind. Rust (*Puccinia allii*), common on onion and garlic, does not cause severe loss, but lowers the market value of the crop. A considerable amount of damage on plantings of broad bean is caused by *Uromyces fabae* and zonate leaf spot (*Cercospora zonata*). Powdery mildew (*Oidium* sp.) is the most important disease of vegetable marrow. The publication concludes with a list of diseases recorded for the island, but not found during this survey, and some common ones absent or rare. The comparative freedom of vines from disease is noteworthy.

Johnston (C. O.), Hansing (E. D.), Sill (W. H.), Haskett (W. C.), & Rogerson (C. T.). **Kansas phytopathological notes: 1955.**—*Trans. Kans. Acad. Sci.*, **60**, 2, pp. 148–154, 1957.

Septoria tritici was abundant in some fields of wheat in the SE.; pycnidia formed on awns and glumes in June. *Sclerotium bataticola* [*Macrophomina phaseoli*] was severe on maize and sorghum; *Cladosporium cladosporioides* was prevalent on seed beds of sorghum in 2 counties. *Rhizoctonia crocorum* [*Helicobasidium purpureum*] was severe on lucerne in 1 field and *Uromyces striatus* var. *medicaginis* was present in all lucerne fields in central and eastern regions. A field of Korean lespedeza [*L. stipulacea*] was heavily infected by *Phyllachora lespedezae* [cf. **36**, p. 409]. Stem rust (*Puccinia graminis*) remained severe on Merion blue grass (*Poa pratensis*) turf [cf. **35**, p. 894]. *Diplodia pinea* [cf. **36**, p. 436] continued to cause damage on Austrian [*Pinus austriaca*], Ponderosa [*P. ponderosa*], and Scots pines [*P. sylvestris*]. *Ascochyta rhei* was abundant on rhubarb leaves in one county, the leaves occasionally being almost completely destroyed. *Dendrophoma obscurans* [cf. **34**, p. 136; **35**, p. 159] was severe in a field of strawberry plants. *Erwinia carotovora* [cf. **32**, p. 448; **35**, p. 813] was severe on bearded iris, and leaf spot (*Heterosporium iridis*) [*Mycosphaerella macrospora*] was widespread.

Annual report, East Malling Research Station, 1958 (1st Oct. 1957–30th Sept. 1958). —xxvi+178 pp., 28 fig., 5 diag., 14 graphs, 1959.

Some of the information in this report [cf. **37**, p. 439] has already been noticed. In the General Plant Pathology Section (pp. 25–30) a summary is given of studies by Z. Borecki of apple storage rots (*Gloeosporium album* and *G.* [*Neofabraea*] *perennans*) [**38**, p. 14]; sporulation of both in culture was considerably improved by using spore suspension inoculum instead of pieces of mycelium, the final yield of spores depending on the conc. of inoculum, temp. of incubation, and type of medium. The amount of storage rot in fruits inoculated with *N. perennans* at different times through the summer increased with the conc. of inoculum, whatever the time of inoculation. In comparable experiments *G. album* caused no rot.

Considerable variation was detected in various common weeds, grasses, and cereals in their capacity to resist infection by *Verticillium alboatrum*; all have defence mechanisms comparable with those of the hop [**37**, p. 673]. Conidia produced in great numbers on infected plant debris in the soil proved capable of infecting both sensitive and tolerant hop vars. When Fuggle N hops were inoculated with conidia of a 'fluctuating' strain (F), a normal progressive strain (P), and a P strain isolated from a garden in which tolerant vars. were severely wilted, the rate of wilting caused by both P isolates increased sharply as the numbers of conidia increased, whereas there was only a slight increase with F. When small pieces (1 cm.) of naturally infected hop bine were buried in pots from which the drainage water was led into larger pots containing Fuggle plants, sufficient conidia were produced from one bine fragment to cause 50% infection and wilt; with 3 fragments all Fuggle plants wilted, while OM 26 plants became infected but did not wilt. A grass cover free from all broad-leaved plants may rapidly reduce the quantity of the fungus in the soil, though to what extent is still uncertain.

Apple 'star crack' [**38**, p. 526] is widespread and affects many vars. Early Rivers, Napoleon, and Merton Bigarreau cherry trees with latent virus infection [cf. **38**, p. 368] planted in 1953 are proving far less productive ($\frac{1}{3}$ in the case of Early Rivers) than healthy trees of the same vars.; similar reductions have been noted in the yield of 30 yr.-old trees 4 yr. after inoculation.

Strawberry green petal virus [cf. **38**, p. 217] was transmitted by the leafhopper *Aphrodes bicinctus*, found breeding on strawberry in the field. A. Jha found that most of the viruses transmitted by sap inoculation from strawberry to petunia and other herbaceous hosts were strains of raspberry yellow dwarf virus [**37**, p. 669], which proved to be the agent of strawberry mosaic disease at Cheddar [Somerset], and in Kent.

When M. III apple rootstocks were inoculated in May with conidial suspensions of *Venturia inaequalis* and sprayed the next day with griseofulvin, cinnamic acid, *o*-coumaric acid, or undiluted lime-sulphur, the best control of scab was given by lime-sulphur, but no treatment was effective against inoculations made 3 weeks later.

Bulletins for Fruit Growers include a well-illustrated general account of fire blight (*Erwinia amylovora*) of pear (pp. 151–154) by J. E. Crosse, Margery Bennett, & Constance M. E. Garrett, with special reference to the recent outbreak in Kent [cf. **38**, p. 267]; a summary of the results of resistance trials of some apple rootstock vars. to collar rot (*Phytophthora cactorum*) by G. W. F. Sewell & J. R. Wilson (pp. 155–156), already published [**38**, p. 265]; notes on 3 new wilt-tolerant hops by J. F. Wilson (pp. 161–162) [**38**, p. 613]; and progress in research on *Verticillium* wilt and virus diseases of hops in 1958 by R. V. Harris (pp. 165–167). The bulletin giving a review of research on hop virus diseases at East Malling by J. T. Legg & P. G. Ormerod (pp. 157–160) notes that evidence on the mode of spread of hop nettlehead virus [cf. **37**, p. 132] is conflicting, suggesting that it is either soilborne or carried by a mobile insect or mite vector which only occasionally feeds on hop. Replanting following the removal of affected plants can be of

great value in prolonging the economic life of a plantation. Symptoms of split leaf blotch are described and attention is particularly drawn to the 50% yield loss it causes in Fuggle plants. H. B. S. Montgomery (pp. 163–164) notes the various types of russeting [cf. **37**, p. 726] and cracking in Cox's Orange Pippin (apart from cracking due to virus) and discusses possible causes for them. It is concluded that the severe stalk-end cracking observed in 1958 was probably correlated with unusual climatic conditions.

Keyworth (W. G.). **Plant Pathology Report.**—*Rep. nat. Veg. Res. Sta., Warwick,* **9** (*1957–1958*), pp. 36–39, 1959.

R. B. Maude notes further fungicide trials [cf. **37**, p. 511] against stem rot (*Didymella* [*lycopersici*]) of outdoor tomatoes; 0·5% maneb and 0·25% captan gave good control when applied every 3 weeks. Reduction of the amount of spray applied from 150 to 50 ml./plant did not lessen the effect. F_1 progeny of *Lycopersicon hirsutum* × the tomato var. Harbinger were resistant to both stem and root infection.

In further work on different forms of parsnip canker (*Itersonilia* or *Phoma* spp.) [loc. cit.] A. G. Channon found that black cankers were fewer and smaller on June-sown than on March-sown roots, this difference being apparent in both the Nov. and Jan. liftings; orange-brown cankers, from which no pathogen has been obtained, behaved similarly, ratings in Nov. for the Apr.-sown crop being approx. intermediate. Orange-brown cankers on the June crop increased in number and size between Nov. and Jan., but those on the Mar. and April crops did not. There was extensive development of black canker in soil clamps with straw chimneys, and there was *Botrytis* attack in a straw clamp with a sod covering.

In trials of aldrin against clubroot [*Plasmodiophora brassicae*] on Primo cabbage the same worker used 2 rates of application, viz. $\frac{1}{4}$ pint/plant at 4 concs. from 0·08 to 0·27%, and $\frac{1}{2}$ pint/plant at 0·04–0·135%. The control achieved increased with increasing doses of the fungicide, but the higher ones were somewhat phytotoxic. In another experiment endrin (0·06–0·09%) and aldrin (0·04%), applied shortly after planting, reduced the level of infection, as did a pre-planting dibble hole treatment with 0·05% $HgCl_2$, the last 2 increasing yields. With endrin phytotoxicity outweighed the control effects. It is noteworthy that pentachloronitrobenzene (PCNB) applied as a wettable powder (0·75%) shortly after transplanting gave significantly greater yields, though it was almost without effect on the disease. In a 3rd experiment beds given a 2% solution of a commercial preparation of sodium n-methyl dithiocarbamate 6 weeks before sowing had very much less infection than untreated beds 4 weeks after sowing, but the effect did not last.

J. A. Tomlinson & Bridget R. Smith report that lettuce big vein disease [**37**, p. 621] was detected in material from Yorkshire, Suffolk, and Dorset, and was reported from Wiltshire and Bristol. Symptoms were various, and in host-range investigations developed in *Lactuca dregeana*, *L. saligna*, *L. altaica*, and *Sonchus asper* after watering with sap from infected lettuce roots, while *S. oleraceus* developed indistinct symptoms and *L. sagittata* remained free, though root sap from inoculated plants of both these spp. infected Lobjoits Green cos. A fungus similar to *Olpidium brassicae* [cf. **38**, p. 441] was present in affected field plants and experimentally infected plants.

J. A. Tomlinson & M. J. W. Webb found that experimental powdery mildew infection (*Erysiphe polygoni*) of turnip and cabbage was controlled to a considerable extent when the plants were grown in pots containing 1% (w/w) Zn frit or when the soil was watered with $ZnSO_4$ solution containing 500 p.p.m. Zn. The control appeared to result from accumulation of the metal in the leaves [cf. **35**, p. 547]. However, increases in Zn level in the leaves of cucumber and vegetable marrow growing in treated soils did not significantly reduce their susceptibility to *E. cichoracearum*.

Application of botrilex, a 20% powder formulation of PCNB, either mixed in the top in. of soil at ½–1 oz./sq. yd. or watered on as a 75% wettable powder suspension, ⅛–¼ oz./gal./sq. yd. before sowing, gave very good control of *Rhizoctonia* sp. causing damping-off and wirestem of brassicas. It proved as effective as $HgCl_2$ (1 gal./sq. yd., 1:2,000 solution) and is less toxic.

Plant disease survey for the twelve months ending 30th June 1958. Twenty-eighth Annual Report N.S.W. Department of Agriculture. Biological Branch-Division of Science Services.—46 pp., 1 map, [? 1958. Mimeographed.]

This report [cf. **37**, p. 326; **38**, p. 120] contains a number of new records for N.S.W. The strains of leaf rust (*Puccinia triticina*) now prevalent in E. Australia are those attacking Spica wheat, despite the small amount of this var., whereas up to 1954 these strains were rare. Downy mildew (*Sclerospora macrospora*) on oats, rarely recorded in N.S.W. and not seen for many years, was observed at Leeton (M.I.A.). Maize wallaby ear virus disease was recorded for the 1st time in N.S.W. on the north coast, though it has apparently been present in trace amounts for many years. The symptoms developed most strongly in crops infected while very young and which later experienced very dry conditions. The disease has long been present in southern Queensland [**21**, p. 484]. *Ustilago sphaerogena* on *Echinochloa colonum* [cf. **21**, p. 20] was recorded for the 1st time, and *Puccinia purpurea* [map 212] on Columbus grass (*Sorghum almum*) at Grafton Experiment Farm, North Coast, was another new host record.

Two diseases rare in N.S.W., sooty blotch (*Polythrincium* [*Cymadothea*] *trifolii*) on crimson clover, previously recorded only on red clover, and rust (*Uromyces flectens*) on white clover, were found in a clover introduction plot. Leaf spot (*Cercospora* sp.), not previously recorded on white clover, was observed on this host on the South Coast, and [*Datura*] rugose leaf curl virus in irrigated stands of the Ladino var. was another new host record for N.S.W. [cf. **36**, p. 575]. Anthracnose (*Colletotrichum trifolii*) [cf. **36**, p. 307] on *Medicago denticulata* was a new host record and wilt (*Verticillium* sp.), powdery mildew (*Oidium* sp.), and [tomato] big bud virus [**37**, p. 134] on sesame, the last named affecting 10–15% of plants in a trial area, were new State records.

Brown stem-rot (*Phytophthora parasitica*) of tobacco was recorded from a small area of Hicks. Previously assumed to be 'black-shank' caused by *P. parasitica* var. *nicotianae*, the disease was never serious in northern N.S.W. or southern Queensland nor has the fungus been shown to be virulently pathogenic [cf. **33**, p. 210]. It is now believed that the disease is that occurring in Africa, and named 'brown stem-rot' [**18**, p. 762] to distinguish it from the more virulent 'black-shank'.

Cases of sudden death (? *Coprinus* sp.) of citrus were reported from several areas. About 25 grapefruit trees on Seville orange stock were found to be affected, the 1st record of the disease on a stock other than trifoliate orange. A serious decline of 3-yr.-old Ellendale mandarins on trifoliate stock appears to be due to xyloporosis virus.

The 1st record of papaw black spot (*Ascochyta caricae*) [cf. **34**, pp. 136, 606] was at Coff's Harbour, where it produced a leaf and stem rot. A serious deterioration of grape vines (100% in 1 vineyard), previously thought to be Pierce's disease [lucerne dwarf virus: **37**, p. 326], has now proved to be due to the [vine] leaf roll virus. A vein clearing virus transmissible to the indicator var. Rupestris St. George has been found in Chasselas and Tokay vines and the stock vars. 3306 and ARG1. Deterioration, of unknown origin and not attributable to leaf roll or mosaic [vine infectious degeneration] virus [cf. **36**, p. 454], was noted in a large Corowa vineyard. Two conditions were distinguished: the most widespread and important was a marked deterioration and the other was a premature reddening of foliage of Grand Noir, Alicante Bouschet, and Terega. Rachitism [cf. **1**, p. 50; **17**, p. 221],

also of unknown origin, was reported principally on Black Muscat. A serious development also occurred of bunch stem dieback, another disease of which the cause is unknown.

The following diseases of ornamentals were recorded for the 1st time in N.S.W.: root rot (*Phytophthora* sp.) of aloe; wood rot (*Schizophyllum commune*) of cassia; root rot (*P. cinnamomi*) of Christmas bush (*Ceratopetalum gummiferum*), which caused heavy losses of plants grown commercially at Castle Hill, and of young ti-tree (*Leptospermum lambethii*); root rot (*Armillaria mellea*) which attacked *Hakea suaveolens* at the Botanic Gardens, and was also found infecting *Cotoneaster pannosa* and forsythia at Mt. Wilson; rust (*Cronartium jacksonii*) on *Gompholobium latifolium*; wilt (*Verticillium* sp.) on *Acer japonicum*; greening ([tomato] big bud virus) on nasturtium (*Tropaeolum majus*); mosaic (? cucumber mosaic virus) on an orchid (*Calanthe vestita*); root rot (*P. parasitica*) of pansy; flower blight (*Botrytis cinerea*) of poinsettia (*Euphorbia pulcherrima*) following wet conditions and strong winds; powdery mildew (*Oidium* sp.) on Portuguese laurel (*Prunus lusitanicus*); powdery mildew (*Erysiphe polygoni*) on *Ranunculus* sp.; and leaf smut (*Urocystis eranthidis*) on winter aconite (*Eranthis hiemalis*).

Other diseases recorded were powdery mildew (*Oidium* sp.) of French beans (*Phaseolus vulgaris*) causing leaf drop and pod russeting, a 1st record in N.S.W.; rust (*Uromyces betae*), a disease of rare occurrence in the State, found to be severely affecting a crop of silver beet at Revesby; and club root (*Plasmodiophora brassicae*), recorded for the 1st time on brussel sprouts, causing moderate loss; *Fusarium* wilt (*F. oxysporum* f. *melonis*) [**37**, p. 64], of major importance on rockmelons at Griffith during the late spring and early summer though not previously recorded in that area, caused damping-off of seedlings with up to 60% loss during Oct. and Nov. and 20–40% in a number of plantings; ? squash mosaic virus on squash, marrow, and pumpkin was similar in many respects to that described in other countries [cf. **37**, p. 752; **38**, p. 52]; powdery dry rot (*F. trichothecioides*) [**34**, p. 285] caused serious losses in consignments of certified seed potatoes; and rugose mosaic (potato virus X and Y), for the 1st time in many years was responsible for the rejection of crops from certification, the Walanga var. ceasing to be accepted.

Lynn (C. W.). **Annual Report, Department of Agriculture, Northern Rhodesia, for the year 1958.**—22 pp., 1959.

In the sections of this report [cf. **37**, p. 514] on plant pathology (p. 17), wheat (p. 16), and groundnuts (p. 15) it is stated that rainy-season or summer wheat was heavily attacked by *Helminthosporium sativum* [*Cochliobolus sativus*]; some selected vars. displayed fair resistance, but none was immune. Yellow stripe rust (*Puccinia glumarum*) [map 97], on wheat at Abercorn, was a new record for Northern Rhodesia, but the disease is unlikely to spread southwards. Maize streak virus was much in evidence and was serious in parts of the Central and Southern Provinces. An undetermined wilt of *Crotalaria intermedia* and another undetermined disease leading to stem break in sunflowers are causing anxiety.

During 1957–8, when the prevailing conditions favoured the infection of groundnuts by *Cercospora personata* [*Mycosphaerella arachidicola*], the susceptible Manyema var. unsprayed gave only 636 lb./acre, as against 1,436 lb./acre when sprayed with Bordeaux mixture. The Pimpernel and Dutch Robijn vars. possess good resistance to *Phytophthora* [*infestans*], but Pimpernel is affected by delayed sprouting; Ulster Prince, though very susceptible to blight, yields outstandingly well.

Steer (W. C.). (Editor.) **Fifty years of Botany.**—xiii+638 pp., 16 pl., 31 fig., 14 graphs, 2 maps, New York, Toronto, London, McGraw-Hill Book Company, Inc., 1958. 77*s.* 6*d.*

This Golden Jubilee Volume of the Botanical Society of America embodies the

co-operative contributions of individual experts in the various fields of plant science covering most of the major advances in botany during the past 50 yr. Emphasis is laid on present trends and future problems and on the contributions of plant science to mankind and civilization. In a paper entitled 'Microbes—Man's mighty midgets' (pp. 33–49), K. B. Raper discusses the production of organic acids, vitamin biosynthesis, microbial enzymes, antibiotics, and microbial conversions. J. G. Horsfall in a contribution on 'The fight with the fungi' (pp. 50–60) gives a concise delineation of disease control from earliest times to the present day. 'Problems in preventing plant-disease epidemics' are surveyed in broad terms by E. C. Stakman (pp. 61–77), and Katherine Esau presents 'An anatomist's view of virus diseases' (pp. 78–94). The paper from W. H. Weston on 'Mycology during the past fifty years' (pp. 570–580) has already been noticed [**36**, p. 484].

Dobrozrakova (Mme T. L.). Лабораторные занятия по фитопатологии. [Laboratory works on phytopathology.]—224 pp., 89 fig., State Publishers of Agricultural Literature, Moscow–Leningrad, 1958. Roubles 4.75.

In this 2nd revised edition of a textbook for students in colleges and universities preliminary chapters on the microscope and on fungus groups (with keys to genera), bacteria, and viruses are followed by treatment of diseases (with keys) under hosts, the principal fungicides are reviewed, and methods of estimating diseases described.

Scanga (F.). **La celula bacteriana.** [The bacterial cell.]—xvi+475 pp., 511 fig., 2 diag., 1 graph, Madrid, Aguilar S. A. de Ediciones, 1959. Pes. 300.

This review, originally published in Italian (Editorial Il Pensiero Scientifico, Rome), of present knowledge, amply illustrated by electron micrographs, besides describing in detail in 7 chapters the structure of the bacterial cell and its parts, deals *inter alia* with reproduction, movement, growth, rickettsia and viruses, bacteriophages, cytological techniques, and the action of antibiotics and chemotherapeutants. There is a 14-page bibliography followed by author and subject indexes.

Friedman (B. A.) & Ceponis (M. J.). **Relationship of loss of pectolytic enzyme synthesis to avirulence of induced mutant strains of a soft rot bacterium.**—Abs. in *Phytopathology*, **49**, 4, p. 227, 1959.

Of a number of isolates of *Pseudomonas marginalis* rendered avirulent by ultraviolet irradiation 5 failed to produce in culture detectable pectolytic enzymes (protopectinase, pectin depolymerase, and pectinmethylesterase) formed by the parent [**38**, p. 440], the failure persisting over 6 months of transfer at biweekly intervals. Supplementing the culture of 1 isolate with unheated pectin failed to induce production of pectolytic enzymes, nor did this isolate produce alkali from Na pectate or polygalacturonate or acid from sucrose as the sole C source in the culture medium. These changes are considered to be genetic and the cause of loss of virulence.

Manigault (P.) & Stoll (C.). **Induction aseptique d'une tumeur végétale (crown-gall). Participation des acides nucléiques de la bactérie, Agrobacterium tumefaciens (Smith et Townsend).** [Aseptic induction of a plant tumour (crown gall). Participation of the nucleic acids of the bacterium, *A. tumefaciens*.]—*Ann. Inst. Pasteur*, **95**, 6, pp. 793–795, 1958. [English summary.]

The inoculation of *Datura stramonium* with a mixture of 'wound sap' from incised internodes of the same host and the nucleic acids from a culture of the pathogen of particular virulence for that plant resulted in the production of tumours 5–20 mm. diam. [**38**, pp. 240, 452].

Jonard (R.). **Étude comparative des radiosensibilités de tissus normaux et de tissus de crown-gall de Scorsonère cultivés in vitro.** [Comparative study of the susceptibility to radium of normal and crown gall-infected *Scorzonera* tissues cultured *in vitro*.]—*C. R. Acad. Sci., Paris*, **248**, 19, pp. 2807–2809, 1 graph, 1959.

The growth of both normal *S.* [*hispanica*] tissues and those infected by crown gall [*Agrobacterium tumefaciens*: see above] was inhibited by X-rays at dosages of 1,000–2,000 r., but the effects on the latter were stronger and more lasting, denoting greater susceptibility.

Amtliches Pflanzenschutzmittelverzeichnis und Pflanzenschutzgeräteverzeichnis 1959 der Bundesanstalt für Pflanzenschutz, Wien. [Official list of plant protectives and plant protection equipment 1959 of the Federal Institute for Plant Protection, Vienna.]—*Pflanzenarzt*, **12**, Sondernummer 1, 43 pp., 1959.

A tabulation on the usual lines [cf. **38**, p. 59].

Livingston (J. E.) & Hilborn (M. T.). **The control of plant diseases by chemotherapy.**—*Econ. Bot.*, **13**, 1, pp. 3–29, 5 fig., 1959. [222 ref.]

A review of the literature [cf. **33**, p. 543], with sections on bacterial, fungal, and virus diseases. Virtually all the information presented has already been noticed in this *Review*.

Grou (Elvira) & Bontea (Vera). **Compatibilitatea chimică a produselor noi folosîte in protecția plantelor.** [Chemical compatibility of new compounds used for plant protection.]—*Anal. Inst. Circ. agron.*, N.S., **25**, 6, pp. 575–585, 1958. [Russian and French summaries. Received Apr. 1959.]

The results of several yr. experimentation by the Ministry of Agriculture, Romania, showed the following mixtures to be chemically compatible: calcium polysulphide with Ca arsenate, BHC, and DDT, Bordeaux mixture with wettable S, or DDT, wettable S with BHC or DDT, calcium and lead arsenate with BHC or DDT, parathion with BHC and DDT, and BHC with 2,4-D. Ca polysulphide is incompatible with Bordeaux and with lead arsenate and Bordeaux with BHC.

Bordeaux mixture+wettable S proved effective against apple scab (*Endostigma* [*Venturia*] *inaequalis*) and mildew (*Podosphaera leucotricha*) [**37**, p. 515], and also against vine mildew [*Plasmopara viticola*: **37**, p. 696] and *Oidium* sp. [*Uncinula necator*].

Fontana (P.) & Casarini (B.). **Adesività e persistenza di alcuni anticrittogamici.** [Adhesiveness and persistence of certain fungicides.]—*Progr. agric. Bologna*, **5**, 2, pp. 209–222, 2 fig., 5 graphs, 1959.

At the University of Bologna potted beet and bean [*Phaseolus* sp.] plants were sprayed once with various fungicides and later sprayed at intervals over a period of some days with water. Before washing there was a mean daily loss from beet plants given Bordeaux of 7·4 μg. Cu/g. leaf, the corresponding figures for aspor and copper oxychloride being 43·2 μg. EBD Zn and 18 μg. Cu. From washed beet plants there was a mean loss of 7·1 μg. of Cu/l. washing water for leaves sprayed with Bordeaux, the corresponding figure for copper oxychloride being 8·2 μg. Cu, and for aspor 24·5 μg. EBD Zn.

On beans not sprayed with water the mean daily loss of Cu from Bordeaux was 9·5 μg./g. leaf/day, from copper oxychloride 19·6 and from Caffaro powder 14; with aspor the corresponding figure was 48·1 μg EBD Zn. After spraying with water, bean leaves showed a mean loss/l. water of 7·8 μg of active material for Bordeaux, 24·6 for aspor, 9·6 for copper oxychloride, and 18 for Caffaro powder.

The biological activity of the fungicidal deposit was also determined by the effect of disks from treated leaves on sporangial germination of *Plasmopara viticola*. The evidence showed that Bordeaux mixture was very persistent on leaves of both beet and bean. The residue left even after max. washing was highly active against *P. viticola*, 99–46 p.p.m. Cu in the conidial suspension completely inhibiting germination. The persistence of aspor was low, but residues containing 65, 65, 24, 11·7, and 0·38 p.p.m. EBD Zn gave, respectively, 100, 100, 97, 90, and 28% inhibition of germination. The corresponding figures for copper oxychloride residues were: 50, 50, 28, 26, 18, 17, and 9 p.p.m. Cu, giving, respectively, 77, 75, 64, 60, 57, 53, and 44% reduction of germination. For Caffaro, 32 and 5 p.p.m. Cu deposits gave, respectively, 100 and 73% reduction in germination.

Other experimental evidence confirmed the view that the fungicidal efficacy of Cu products is not directly related to their solubility in water [cf. **38**, p. 180], but to the particular form (ionic, complex, or molecular) in which the Cu is present in solution.

MacCarthy (H. R.). **A technique for assessing leaf coverage with zinc fungicides.** —*Plant Dis. Reptr*, **43**, 1, pp. 115–117, 1 fig., 1959.

At the Science Service Laboratory, University of British Columbia, Vancouver, a technique for printing Cu spray patterns [**13**, p. 587] was adapted to assess common Zn fungicides on potato leaves, using as indicator a solution of 100 mg. dithizone in 75 ml. carbon tetrachloride, with the addition of 200 ml. 95% ethyl alcohol. The colour change was from green to purple-red.

Lindström (O.). **Rapid microdetermination of mercury by spectrophotometric flame combustion.**—*Analyt. Chem.*, **31**, 3, pp. 461–467, 1 diag., 1959. [15 ref.]

A new method is fully described from AB Casco, Stockholm, Sweden, for the determination of μg. amounts of Hg in small samples, e.g. of paper and pulp products and cereal seed kernels treated with fungicides [cf. below]. The sample is burnt with an atomizer-burner, with the production of Hg vapour. The Hg content of the gas stream is estimated by means of a vapour meter. Seed disinfectants are prepared for analysis simply by dilution with water. Individual kernels treated with Hg-containing dressings are analysed by a simple and rapid technique, based on radioactive tracing, in which only the surface layer, where the fungicide is located, is eluted with a drop of HNO_3. The Hg in pulp and paper products can be estimated after partial digestion.

Lindström (O.). **Fungicide distribution and disinfection efficiency in seed treatment.** —*J. agric. Fd Chem.*, **7**, 5, pp. 326–329, 2 graphs, 1959.

Relations between fungicidal dose and disinfection efficiency are formulated by chemical kinetic procedures [**38**, p. 58]. It is postulated that diseased seedlings arise from 'disease centres' which are Poisson-distributed between the seed kernels. The rate of disinfection of these centres is controlled by a rate-determining step in one of the physical and chemical processes involved. The reaction order is thus obtained by analysis of biological test results. These relations are used to calculate the drop in disinfection efficiency to be expected for unevenly as compared with uniformly treated seeds. By this means it was shown that the distribution parameters reported for panogen liquid seed treatment are satisfactory, reduction in efficiency being negligible.

Grewal (J. S.) & Vir (D.). **Efficacy of different fungicides. I. Seed disinfection in relation to stem rot of Jute and stripe disease of Barley.**—*Indian Phytopath.*, **11**, 2, pp. 175–178, 1958.

In laboratory tests at the Indian Agricultural Research Institute, New Dehli, 19

seed dressing fungicides were examined for the control of stem rot (*Macrophomina phaseoli*) [**38**, pp. 85, 723] of jute (var. JRC 412) and barley stripe (*Helminthosporium gramineum*) [**33**, p. 291] (var. N.P. 3). The jute was 100% naturally infected, the barley was spore-inoculated. Ceresan at 0·6%, flit 406 at 0·5%, and agrosan 5 W at 0·6% completely inhibited *M. phaseoli* from growing out of the seeds onto potato dextrose agar. Fusariol at 0·18, agrosan GN at 0·3, and agrosan 5 W at 0·15% completely inhibited *H. gramineum*.

Ark (P. A.) & Thompson (J. P.). **Streptomycin formulations and their relation to the concentration of the antibiotic in the cell sap of various plants under different conditions. Stability of streptomycin dust formulations.**—*Plant Dis. Reptr*, **43**, 1, pp. 72–78; pp. 79–80, 1959.

In further work at the University of California, Berkeley [**38**, p. 185], the rate of release of streptomycin from prepared dusts in water, assayed against *Erwinia amylovora*, was more gradual from nuclay than from $CaCO_3$ or from formulations with agricultural grade gypsum. Nuclay and gypsum dusts containing 1,000 p.p.m. streptomycin were applied gently to both sides of the leaves of greenhouse-grown Marketer cucumber at the 4-leaf stage, slightly damped by a very fine mist. The streptomycin level in the sap reached a max. in 1 day, began to decrease very slowly about the 3rd day, but was fairly high even after 2 weeks. Plants allowed to wilt by drying the pots absorbed an amount equivalent to non-wilted. Differences in temp. (2½–80° C.) had little effect on absorption.

A considerable quantity of streptomycin was demonstrated in the sap of all the plants studied (almond, apricot, cherry, peach, *Phaseolus vulgaris*, tomato) regardless of type of formulation, though there was often slightly more from a 2,000 p.p.m. dust applied to a moist leaf surface than from a 1,000 p.p.m. spray.

In the 2nd paper it is reported that streptomycin formulated with pyrax ABB, nuclay, S, or gypsum as dust carriers did not appreciably diminish in potency (tested against *Erwinia amylovora*) during 3 yr. of dry storage in paper bags at 23–25° C. [cf. **36**, p. 257].

Kharin (S. A.). Краткая характеристика процесса опыливания растений. [Brief characteristics of the process of plant dusting.]—Тр. Ста. Защ. Раст. Казахск. фил. ВАСХНИЛ [*Trud. Sta. Zashch. Rast. Kazakh. fil. VASKNIL*], **3**, pp. 94–109, 12 fig., 1 graph, 1956. [Received Apr. 1959.]

This technical paper deals with the principles of plant dusting, gives details of different types of dusting apparatus and their physico-mechanical properties in relation to coverage of the crop, discusses the special properties of plants, such as leaf surface, which affect this, and the part played by the meteorological conditions, and concludes with a comparison of methods.

Dunskiĭ (V. F.) & Kitaev (A. V.). Электростатическое опрыскивание [Electrostatic spraying.]—Защ. Раст., Москва [*Zashch. Rast., Moscow*], **3**, 4, pp. 17–18, 1 fig., 1958.

Electrostatic atomization and spraying [cf. **32**, p. 138] is being investigated by the Moscow Institute of Agricultural Mechanization and Electrification in collaboration with the Moscow Health Station, and a new method for charging particles by electrostatic induction is being studied. Comparatively low voltages (1,000 v.) and little power (0·1 watts) are needed, which simplifies the construction of the apparatus and assures safety of operation. Experiments were carried out with an electrostatic atomizer consisting of a normal manual paint atomizer with a special nozzle. As the air stream passes through the ring-shaped gap between a negatively charged insulated axle and the earthed jet, the water film becomes positively charged by induction, while the negative charge becomes earthed through the non-disintegrating

part of the film which runs off. The atomizer was tested out in a chamber (1·2 cu. m.) and in a room (68 cu. m.). The av. size of the electrified drop was 2–3 times less than the non-electrified drop. About half the liquid (31–60%) settled on the walls and ceiling, which was 4–5 times the amount with ordinary atomization. Even more striking was the quantity of liquid settling on the ceiling: 4–8% with electrification and 0·003–0·03% without. Disinfection by the new method would make possible a great saving of chemical compounds. With no electrification even the smallest drops (1–5 μ) mostly settled only on the floor, but when electrified were evenly distributed over all surfaces. As the size of the drops increased the influence of electrification diminished. Nevertheless, with dimensions of 10 μ, or even 30–40 μ, adequate coverage of the ceiling was assured. Even better results were obtained with more powerful apparatus. Work is now proceeding on the elaboration of motorized, small drop, electrostatic atomizers for use in garden and field.

Padwick (G. W.). **Plant diseases in the colonies.**—*Outlook on Agric.*, **2**, 3, pp. 122–126, 1959.

This paper from Plant Protection Ltd., Fernhurst Research Station, Haslemere, Surrey, based on information already noticed [**36**, p. 44], draws attention to the general dearth of accurate information on the incidence and economic importance of crop diseases, and seeks to indicate the types of loss in various kinds of crops (permanent and semi-permanent, vegetatively propagated, and grown from seed), examples of major tropical crops being used in illustration. A brief estimate of losses in Colonial territories of the Commonwealth is included.

Grainger (J.). **Effects of diseases on crop plants.**—*Outlook on Agric.*, **2**, 3, pp. 114–121, 10 graphs, 1959.

Some results of experimental work [cf. **36**, p. 604] undertaken during the last decade at Auchincruive on the relations between crop hosts and their parasites under conditions in the west of Scotland are discussed. In studying the effects of diseases on crop plants more attention must be paid to the host than it usually receives. The green plant is able to compensate for damage to its organs, and a quantitative estimate of this action is essential to rational interpretation of economic losses from disease.

Kervegant (D.). **La classification décimale universelle appliqueé à la 'protection des plantes'.** [The universal decimal classification applied to 'plant protection'.]—*Ann. Épiphyt.*, **9** (*1958*), 4, pp. 551–558, 1959.

A new version of Section 632 (Plant damage, injuries, diseases and pests, plant protection) of the Universal Decimal Classification is presented in tabular form in French, English, and German. It has received the approval of the International Federation of Documentation and is to be used to index the papers appearing in *Ann. Épiphyt.*

Hora (F. B.). **Presidential address. Quantitative experiments on toadstool production in woods.**—*Trans. Brit. mycol. Soc.*, **42**, 1, pp. 1–14, 1 diag., 6 graphs, 1959.

This address, read in Dec. 1958, covers observations made in 1956–58, near Reading, on the effect of fertilizers on the production of agaric sporophores. In the 1st yr. 5 plots in each of 3 Scots pine (*Pinus sylvestris*) plantations each received one of the following: 6 oz. hydrated lime, 3 oz. superphosphate, 3 oz. ammonium sulphate, 3 oz. 'Growmore' complete fertilizer, or 1½ oz. KNO_3/sq. yd., while in the 2nd yr. all the plots except the lime, which was redressed as before, were treated

with 'Growmore'. The species are listed and the results for *Lactarius rufus*, *Paxillus involutus*, and *Omphalia maura* recorded graphically. The 1st two increased enormously under ammonium N and P, and decreased with lime. *O. maura* occurred only on the limed plots, increasing from 13 to over 25,000 in the peak yr. (*Nature, Lond.*, **181**, pp. 1668–1669, 1958.) The results are discussed.

Gay (J. L.), Hutchinson (S. A.), & Taggart (J.). **Spore discharge in the Basidiomycetes. I. Periodicity of spore discharge by Trametes gibbosa Fr.**—*Ann. Bot., Lond.*, N.S., **23**, 90, pp. 297–306, 2 pl., 1 fig., 2 diag., 1959. [17 ref.]

At the Dept of Botany, University of Glasgow, an apparatus recorded continuously the number of spores discharged by a strip of hymenium (4·5 × 0·1 cm.) of *T. gibbosa*, the records being extended by a direct microscope study of the number of spores falling through a small area below the hymenium during successive short periods. The rate of discharge was not uniform over the whole hymenium nor was it constant at any one site, though it was rhythmical there, with 30–90 min. intervals between maxima. The areas of hymenium examined showed nearly the same rhythm overall, but the phase of the rhythm differed at different sites in the area.

Leopold (J.), Valtr (Z.), & Seichertová (Olga). **Charakteristika pilsně rodu Penicillium vyskytující se jako infekce při výrobě kyseliny citronové kvasnou cestou.** [Characteristics of fungi of the genus *Penicillium* in the production of citric acid by fermentation.]—*Čsl. Mikrobiol.*, **3**, 6, pp. 377–382, 1958. [*Biol. Abstr.*, **33**, 6, p. 1857, 1959.]

During the fermentation of citric acid *P. purpurogenum* parasitized *Aspergillus niger*, which does not grow in a molasses fermentation medium. The parasite can also grow on dead mycelium of *A. niger* if the substances essential for its growth are not extracted.

Moreau (C.) & Moreau (Mireille). **Pollution fongique de l'atmosphère. Sa responsabilité dans les altérations de quelques denrées alimentaires.** [Fungal pollution of the atmosphere. Its responsibility in the spoilage of certain food products.]—*Bull. Soc. mycol. Fr.*, **75**, 1, pp. 72–79, 1959.

The results are given of tests for the presence of fungi in the atmosphere of the conditioning rooms of a large fruit-storage depot near Paris [cf. **36**, p. 98], cheese drying rooms in western France, drying-tunnels for farinaceous foods, and different parts of a sausage factory; the fungi found are tabulated. Citrus fruits, apples, pears, cheeses, noodles, and dried pork meat owe an appreciable part of the spoilage they undergo to contamination during storage.

A list of national plant quarantine services.—11 pp., Rome, Agriculture Division, Food and Agriculture Organization of the United Nations, 1958. [Cyclostyled.]

The names and addresses of national agencies responsible for the administration of plant quarantine in various countries and territories, and the names of the officers in charge are listed in this publication (FAO/58/5/4024).

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, **7**, 4, pp. 55–60, 1959.

Details are presented of The Plant Pests and Diseases (Importation) Regulations (Federation of Rhodesia and Nyasaland) 1958, published in the *Fed. Govt. Gaz. Suppl.*, 26 Dec. 1958, modifying the territorial regulations controlling the importation of plants etc. and bringing them into compliance with the requirements of the Phytosanitary Convention for Africa South of the Sahara.

Venkata Ram (C. S.). **Cellulose decomposition.**—*Mem. Indian bot. Soc.*, 1, pp. 102–106, 1958.

Reviewing recent progress in knowledge of the breakdown of cellulose by fungi [cf. **37**, p. 23 *et passim*], the author suggests that it would be worth-while to study the ability of various plant pathogens to use cellulosic substrates in toxin synthesis. It seems very probable that fungi, in invading the root system of many crop plants, utilize the cellulose of the host tissue as a C source, but their ability to elaborate toxins and antibiotics on different cellulosic substrates has never been investigated.

Tandon (R. N.) & Bilgrami (K. S.). **The utilization of starch by two species of Phyllosticta.**—*Curr. Sci.*, **28**, 1, pp. 25–26, 1 fig., 1959.

At the University of Allahabad, India, chromatographic analysis of the filtrates of single spore cultures of *P. cycadina* and *P. artocarpina*, inoculated daily into a medium consisting of 10 g. starch, 3·5 g. KNO_3, 1·75 g. KH_2PO_4, and 0·75 g. $MgSO_4$. 7 H_2O in 1 l. water, showed that during growth the starch, which had disappeared by the 3rd and 4th day, respectively, was not only converted into maltose R_f 0·55 and glucose R_f 0·68, but that 3 other oligo-saccharides (R_f 0·45, 0·37, and 0·3) also appeared. The results indicated that the 2 spp. hydrolyse starch by α amylases. Further information is to be published.

Singh (R. K.). **Toxicity of the exo-enzyme produced by Fusarium moniliforme.**—*Indian Phytopath.*, **11**, 2, pp. 188–189, 1958.

Preliminary study of the pectolytic enzymes produced by *F. moniliforme* [*Gibberella fujikuroi*: **38**, p. 185] at the Imperial College of Science and Technology, London, and the relationship between their maceration of vegetable tissue and killing effect showed that the protopectinase activity differed according to the type of vegetable tissue used, cucumber proving the most easily attacked and carrot the least. Toxicity was estimated with cucumber and potato disks, the former being killed much more quickly.

Singh (R. K.). **Fusarium moniliforme Sheld. causing rot of vegetables.**—*Indian Phytopath.*, **11**, 2, pp. 189–191, 1958.

In further work on *F. moniliforme* [*Gibberella fujikuroi*: cf. above] pathogenicity was tested by plug inoculation. Bramley apples were not rotted at 5° C. but from 15° upwards rotting increased, reaching 5–6% of the fruit weight at 25° or 30°. Carrot, turnip, and swede roots and narcissus and onion bulbs were not affected. Potatoes were not attacked at 50°; at 15–30° rot was slight, being cut off by a cork barrier. A comparison of the pathogenicity of *G. fujikuroi*, *F. avenaceum*, and *F. caeruleum* on potato tubers (old Majestic and young Jersey) showed initial attack by all 3, but only the last gave a measurable amount of rotting.

Turner (Elizabeth M. C.). **Inhibition of growth and respiration of Ophiobolus graminis var. avenae and Aspergillus niger by cystine.**—*Nature, Lond.*, **183**, 4668, pp. 1130–1131, 1 graph, 1959.

At the Dept of Botany, University of Oxford, *O. graminis* and its var. *avenae* grew well on a simple medium containing KH_2PO_4, $NaHPO_4$, $MgSO_4$, glucose, thiamin, biotin, and an N source. Cystine and cysteine stimulated growth of *O. graminis*, but inhibited that of var. *avenae* [**36**, p. 692] at a conc. as low as 10^{-6} M, and also that of *A. niger*. Inhibition in both cases was prevented by substituting 0·5% ammonium sulphate for 0·5% ammonium nitrate in the medium and molybdenum added to ammonium nitrate as sodium molybdate fully prevented inhibition. Cysteine inhibited respiration of both fungi in manometer flasks containing phosphate buffer and 2% glucose. The effect of the NO_3 ion on inhibition, preventing the usual protective effect of the NH_4 ion, is an indirect one, since inhibition in its

presence is as great as in its absence. The type of inhibition described indicated a metal chelation effect connected with an early stage of N metabolism.

Goksøyr (J.) & Klungsøyr (L.). **Phosphate compounds in respiring mycelium of Merulius lacrymans (Jacq.) Fr.**—*Acta chem. scand.*, **13**, 3, pp. 497–500, 1 diag., 2 graphs, 1959.

This joint report from the Botanical Laboratory and the Pharmacological Institute, Bergen, Norway, forms part of an investigation on the biochemistry and physiology of *M. lacrymans* (Cartwright strain from the Centraalbureau voor Schimmelcultures). Various phosphate compounds were identified in incubation experiments lasting up to 2 hr by supplying P^{32}-labelled *o*-phosphate. Addition of 10^{-4} M 2,4-dinitrophenol reduced the respiration rate from 5·5 μl. O_2/mg. dry wt. to 1·8, and the percentage of P^{32} incorporated from 1·1 to $< 0{\cdot}01$.

Sagromsky (H.). **Lichtinduzierte Ringbildung. IV. Nachklingen der Rhythmik bei Trichothecium roseum.** [Light-induced zonation. IV. Re-echo of the rhythm in *T. roseum*.]—*Ber. dtsch. bot. Ges.*, **72**, 4, pp. 169–175, 3 fig., 1959.

In further studies [**36**, p. 115] at the Institut für Kulturpflanzenforschung, Gatersleben, Kreis Aschersleben, the rhythmic formation of conidia of *T. roseum* on 3% biomalt agar induced by alternate exposure to light and darkness was, with one exception, eliminated by exposure to continuous light. A short exposure to light (3 min.) is capable of inducing a ring zone.

Griffiths (E. S.). **Cytological and cytochemical aspects of the differentiation of the microconidia of Gloeotinia temulenta.**—Abs. in *Trans. Brit. mycol. Soc.*, **42**, 1, pp. 123–124, 1959.

The purely sexual function of the microconidia of *G. temulenta* and their failure to germinate are linked with the low ribonucleic acid (RNA) content and the absence of a nucleolus, important for RNA synthesis, which appears to be inhibited in the microconidiophores.

Yarwood (C. E.). **Some effects of rust fungi on their hosts.**—Abs. in *Trans. Brit. mycol. Soc.*, **42**, 1, p. 123, 1959.

The first apparent effect of infection by *Uromyces phaseoli* [*U. appendiculatus*] on bean (*Phaseolus vulgaris*) [**36**, p. 294; **37**, p. 79], within a few hr. of inoculation, is stomatal closure, and this is believed to be responsible for the early, transient down-curling of heavily inoculated leaves, followed by upcurling: epidermal nuclei migrate towards the penetrated stomata. Light general and heavy localized uredial infections on susceptible leaves both cause hypertrophy but necrosis results on resistant, while basidiospore infection may cause hyperplasia. Increased photosynthesis from the 2nd–4th day is followed by a decrease. Infection may also produce a temporary increase in the total dry weight of the above-ground parts followed by a decrease after 7 days, but the opposite is true for transpiration: respiration increases at any stage of infection. S, P, and caesium accumulate in rusted tissues [cf. **36**, p. 295], which also have a higher pantothenic acid content than normal tissue. Specific inhibition to secondary infection by the same or a different strain of the rust or a rust of different sp. or even a different genus is caused when leaves, rusted in localized areas, are reinoculated [cf. **33**, p. 573; **36**, p. 340].

Sadasivan (T. S.). **Physiology of host-parasite relationships in plants.**—*Ex* 'Modern Developments in Plant Physiology', Delhi, Aug. 1957, pp. 156–159, 1958. [17 ref.]

In a review of recent progress in this field the author refers particularly to work at the University Botany Laboratory, Madras, on wilt disease of cotton (*Fusarium*

[*oxysporum* f.] *vasinfectum*) and rhizosphere studies [cf. **37**, p. 642; **38**, p. 145]. Commercial chelating agents such as EDTA may be used to study the effect of the selective withdrawal of metals on the potentiation of the toxins and antibiotics [cf. **37**, p. 42]. Study of the uptake of metallic ions in wilt-susceptible plants of different genetic constitution may provide information permitting breeders to select for plants which selectively absorb certain ions, with the result that the potentiation of the toxins is reduced.

Venkata Ram (C. S.). **Environmental factors and physiology of fungal toxins and growth factors.**—*Ex* 'Modern Developments in Plant Physiology', Delhi, Aug. 1957, pp. 167–170, 1958. [23 ref.]

A discussion of the effects on the host of the metabolic products of *Fusarium* spp., and of root exudates on the rhizosphere microflora, and of growth substances thus produced [cf. **37**, p. 168; **38**, p. 475].

Saraswathi Devi (Miss L.). **Fungi and the problems of bioassay.**—*Ex* 'Modern Developments in Plant Physiology', Delhi, Aug. 1957, pp. 163–166, 1958. [14 ref.]

A general discussion [cf. **38**, p. 63] of the use of fungi for assaying chemical elements and compounds, and their advantages and disadvantages, with special reference to *Aspergillus niger*, used to study the influence of the metal content of soils on the incidence of cotton wilt (*Fusarium* [*oxysporum* f.] *vasinfectum*) [cf. **35**, p. 394].

Tokin (B. P.). (Editor). Фитонциды, их роль в природе. [Phytoncides, their role in nature.]—225 pp., 19 fig., 5 graphs, 1 diag., Leningrad University, Leningrad, 1957. Roubles 8·75. [21 pp. ref.]

This is a collection of papers [cf. **38**, p. 447] sponsored by the Council of the Leningrad State University. I. V. Novetel'nov & I. S. Ezhov report (pp. 40–47) on the production of antibiotic substances by seed of Gramineae, describing the method for obtaining the flavone glucosides, which were tested on different saprophytic micro-organisms. An analogous substance was obtained from wheat, and was tested against *P*[*seudomonas*: *Xanthomonas*] *malvacearum* [**38**, p. 84] on cotton seed: at 1:500 and 1:700 it was 100% effective and did not affect germination. When seeds germinate they secrete a yellowish pigment which, in experiments *in vitro*, accelerated germination and formed a phytoncidal zone round the seeds.

D. D. Verderevskiĭ (pp. 48–56), writing on the role of phytoncides in immunity, revises and generalizes the basic theories from the literature, with an emphasis on natural phytoncidal secretions of plants and their action on some pathogens, e.g. *X. malvacearum* and *Fusicladium dendriticum* [*Venturia inaequalis*: **38**, p. 215]. M. V. Gorlenko (pp. 57–61), dealing with phytoncides of higher plants and plant pathogens, explains that epiphytotics of many plant diseases are due to the fact that plants do not secrete phytoncides during certain periods of the year.

E. N. Mishustin & Mme A. N. Naumova (pp. 89–96) report on the toxic after-effect of root excretions of lucerne on cotton and the soil microflora. In the Zhdanov district lucerne roots in sierozem (grey desert soil) secreted saponin, as detected by 2 colour reactions, namely, sulphuric acid+absolute alcohol or ferric chloride. The saponin was found only in the lucerne roots and in the soil around them. Saponin inhibits the germination of cotton seeds at 1·66 mg./ml. Secretion increases with the age of the plant. Under the influence of saponin the growth of *Trichoderma* sp. is suppressed, often completely, while *Fusarium* spp. are insensitive. *X. malvacearum* is also effectively depressed by saponin.

Mme K. I. Beltyukova (pp. 106–118) writes on the effect of phytoncides on phytopathogenic bacteria and their use in phytopathology. Some vars. of bean [*Phaseolus vulgaris*] (Bol'shaya severnaya, Bomba, 2–I Pyatiletka) and Lima bean [*P. lunatus*] have an antibacterial effect on *Pseudomonas panici*, *P. tabacum*, *P.*

coronafaciens, and *P. atrofaciens*. In *in vitro* tests with more than 30 substances on 24 phytopathogenic bacteria, those of the genus *Corynebacterium* were the most susceptible followed by *Xanthomonas*; the most resistant were *Erwinia* spp. Tomato seed treated with arenarin gave plants 100% free from bacterial canker (*C. michiganense*) [**37**, p. 332]. On cabbage seeds it gave much improved germination. A. D. Putrimans (pp. 139–140) showed that the physiological effect of phytoncides from *Pulsatilla pratensis* was 5 times stronger against *Fusarium oxysporum* than against *Aspergillus niger*. Distillates sharply decreased the growth of the fungi. Mme E. V. Zakarova (pp. 199–219) presents a bibliography of Soviet publications on phytoncides followed by a list of titles of papers presented at the 2nd symposium on the problem of phytoncides and not published in this book.

Maruzzella (J. C.) & Freundlich (M.). **Antimicrobial substances from resistant and non-resistant seeds.**—*Nature, Lond.*, **183**, 4666, pp. 972–973, 1959.

Seed extracts were assayed at Long Island University, Brooklyn, New York, against 5 bacteria and 1 actinomycete on nutrient agar and broth, and 5 fungi on Sabauraud dextrose agar and broth. Some bacterial and fungal cultures were incubated at 37° C., the others at room temp., namely, *Streptomyces venezuelae* (1 day), *Erwinia carotovora*, *Pseudomonas phaseolica* (2 days), *Helminthosporium victoriae* strains 1 and 6 (4 days), *Ustilago avenae* strains 38–1, 38–2, and 38–3 and *Colletotrichum lindemuthianum* (7 days), and *Fusarium oxysporum* f. *conglutinans* (2 days). Seed extracts were prepared by adding 50 ml. solvent to 20 mg. dry seeds, soaking for 1 hr., macerating, and filtering. Assay, with 6 repetitions, was by filter-paper disk (6·35 mm. diam. disks, each soaked 4 times in the extract to saturation and air-dried) on seeded agar. Only seeds of cabbage resistant [to ? *E. carotovora*] possessed greater amounts of antimicrobial substances than non-resistant [cf. **30**, p. 622]; failure to obtain any antimicrobial activity from seeds of bean (*Phaseolus vulgaris*) or oat, and only slight activity on 2 test organisms from cantaloupe cannot be explained.

Mirzabekyan (R. O.). Антибиотические вещества актиномицетного происхождения против фитопатогенных микроорганизмов. [Antibiotic substances of actinomycete origin against phytopathogenic micro-organisms.]—*Bull. Acad. Sci., U.S.S.R.*, **24**, 1, pp. 103–110, 1 pl., 1 fig., 1959. [English summary.]

At the Institute of Genetics, Soviet Academy of Sciences, the antibiotics formed by strains 70, 103, 134, 167, and 711 of [unspecified] actinomycetes were shown to be associated with pigments, which, in tests against *Synchytrium endobioticum* on potato [**37**, p. 593] and *Diplodia zeae* [*D. maydis*] on maize, penetrated the sporangia or spores of the fungi and stained their changed protoplasmic contents. Strains 70, 103, and 711 were the most effective against *S. endobioticum* and 103 against *D. maydis*. When the susceptible potato var. Vale was planted in pots of compost soil containing 250–300 *S. endobioticum* sporangia/g. infection was reduced from 97·6% in untreated soil to 16–25% in that to which actinomycetes were applied.

Krassilnikov [Krasil'nikov] (N. A.), Kuchaeva (Mme A. G.), & Skryabin (G. K.). **Utilisation des antagonistes bactériens dans la lutte contre les infections des plantes.** [Utilization of bacterial antagonists in the control of plant infections.]—*Ann. Inst. Pasteur*, **96**, 5, pp. 548–557, 1959. [English summary. 27 ref.]

In more recent experiments [cf. **37**, p. 574 and below] at the Institute of Microbiology, Academy of Sciences, Moscow, the spraying of substances produced by soil actinomycetes [cf. above] onto apricot trees attacked by *Bacterium armeniaca* and beech by *Botrytis cinerea*, and on lemon grafts infected by *Phoma*

[*Deuterophoma*] *tracheiphila* eliminated the pathological symptoms, grisemin being particularly effective.

In laboratory tests cultures of actinomycetes produced 0–120 units/g. of antibiotic material in 16 days, according to soil type, microbiological population, and organic substances, the max. yield being derived from strain 90 on sterile podzol soil with maize extract.

Krasil'nikov (N. A.). О видовой значимости антибиотических веществ у актиномицетов. [On the species significance of antibiotic substances in actinomycetes.]—*Microbiology, Moscow*, **28**, 2, pp. 179–186, 1959. [English summary.]

In further work [cf. above] variants induced experimentally in various actinomycete spp. were found to differ culturally and physiologically and in degree of antibiotic activity, but no qualitative changes in antibiotic properties were recorded. The antagonistic properties and specificity of the antibiotics appear to be stable, hereditary characters and may be used for the classification and identification of species [**36**, p. 546].

Zaĭtseva (Mme Z. M.) & Orlova (Mme N. B.). Изучение условий образования окситетрациклина (террамицина) культурой **Act. rimosus** ЛС-Т-118 [Study of the conditions for the formation of oxytetracycline (terramycin) by *Actinomyces rimosus* culture LS-T-118.]—*Microbiology, Moscow*, **28**, 2, pp. 216–223, 5 graphs, 1959. [English summary.]

At the Institute of Antibiotics, Moscow, U.S.S.R., 2 distinct phases were distinguished in the development of cultures of *A.* [*Streptomyces*] *rimosus*. During the 1st, rapid growth of primary mycelium occurs with no antibiotic formation. Secondary mycelium, developed later, with differentiated protoplasm and reduced basophilia, is able to synthesize antibiotics [**34**, p. 505]. N, C, and inorganic P are necessary for the 1st phase, the prerequisite for transition to the 2nd being the exhaustion of inorganic P in the medium.

Opel (H.). **Über ein 'Selbsthemmungsphänomen' bei Actinomyceten auf flüssigem Nährsubstrat.** [On a 'self-inhibition phenomenon' in actinomycetes on a liquid substrate.]—*Naturwissenschaften*, **46**, 9, pp. 330–331, 1 fig., 1959.

This occurrence was repeatedly observed in the course of experiments on the production of antibiotically active culture filtrates of strain AW_1 at the Institut für Phytopathologie, Aschersleben, Germany. It was particularly noticeable on a glycerin-glycine solution, on which 'zones of inhibition' were formed round the inoculum and the subsequent development of mycelium and spores prevented. In further tests similar zones arose when the surface of the medium was powdered with aluminium dust or *Lycopodium* spores. The phenomenon is attributed to the operation of substances which probably originate in the course of autolysis of ageing mycelium and simulate 'self-inhibition' by the displacement of later germinating inoculum.

Jagnow (G.). **Bodenmikroskopische Untersuchung der Rhizosphäre von Grünlandpflanzen am natürlichen Standort.** [Soil-microscope study of the rhizosphere of meadowland plants in the natural habitat.]—*Naturwissenschaften*, **46**, 8, pp. 269–270, 1 fig., 1959.

At the Institut für Grünlandwirtschaft und Futterbau, University of Giessen, Germany, using the method of Jones and Mollison [**27**, p. 449], the author analysed the microbial populations of samples collected at a depth of 0–5 cm. from (*a*) a dry area of sandy loam bearing abundant red and white clover crops, and (*b*) a permanently damp one of clayey loam colonized predominantly by grasses and *Ranunculus acer*.

In Nov. 1957 (and Apr. 1958) in the (*a*) samples the percentages of actinomycetes in the rhizospheres of *Holcus lanatus*, *Poa pratensis*, white clover, and *Achillea millefolium* were 19 (7), 21 (12), 19 (14), and 15 (17), respectively, and of fungi 22 (13), 15 (10), 17 (8), and 14 (6). In those of (*b*) actinomycetes comprised 25 (14) and 23 (20)% of the microflora surrounding the roots of *H. lanatus* and *R. acer*, respectively, while the corresponding figures for fungi were 14 (12) and 16 (8)%.

The mycelial lengths of the actinomycetes and fungi were 12,000–82,000 and 400–3,200 m./g., respectively. The total weights of the rhizosphere microflora in the dry and damp areas were 68–147 and 227–773 kg./ha., respectively.

Schmidt (H. L.). **Beitrag zur Ermittlung der Pilzbesiedlung bei natürlichen Bőden und ihrer Kennzeichnung durch ein besonderes Verfahren.** [Contribution to the determination of colonization of natural soils by fungi and their identification by a special process.]—*Arch. Mikrobiol.*, **32**, 3, pp. 224–233, 4 fig., 1959.

The method used at the Institut für Bodenkunde der landwirtschaftlichen Hochschule Hohenheim, Stuttgart, involves little disturbance of the soil structure and mycelia. The surface of the samples, in their natural state of moisture, is sprayed with a beer wort agar medium supplemented by rose bengal (1:15,000) [cf. **34**, p. 49]. The hyphae grow through the thin, compact layer of agar and produce conidiophores on the surface. Among the advantages of this procedure over the poured plate and other methods of direct isolation [cf. **38**, p. 396] is the securing of a broader spectrum of the soil population. Thus, *Coemansia* spp., including *C. pectinata*, isolated from all 3 types of samples (forest, adjoining grass verge, and wheat field) were never obtained by other techniques.

Waid (J. S.) & Woodman (M. J.). **A method of estimating hyphal activity in soil.** —*Pédologie, Ghent*, **7**, no. spéc. (Symp. Méth. et Microbiol. Sol), pp. 155–158, 1957. [Received July 1959.]

This method, devised at Merlewood Research Station, Grange-over-Sands, Lancs., has been noticed in brief [**37**, p. 23]. Some of the defects of the Rossi-Cholodny contact slide technique can be partially overcome by the use of nylon gauze (12–30 meshes/cm.) in place of glass slides; nylon contains no additives and, so far as is known, is biologically inert. In trial experiments rectangles of gauze (circa 50 rows and 75 columns of mesh) were marked with a hole punched in one corner, to indicate the bottom edge of the sample, and buried vertically in the soil for at least a month. By the use of coordinates on the stage micrometer 10 columns of mesh spaced 5 columns apart were then sampled, 20 alternately placed meshes/column being examined as a max. (a total of 200 meshes/gauze), and the presence or absence of hyphae/mesh recorded. As a control non-sterile gauzes were incubated and others exposed to the soil for 30 sec. to check the possible occurrence of contamination during insertion, but the quantity of hyphae found was negligible. During exposure in the soil the fungal population on the gauzes fluctuated over 64 days, an initial increase, marked during the 2nd 12 hr., being followed by a decrease after 8 days.

Patel (M. H.), Thirumalachar (M. J.), Desai (M. V.), & Patel (M. K.). **An improved method of testing the longevity of spores of Tolyposporium penicillariae Bref. in soil.**—*Curr. Sci.*, **28**, 1, pp. 28–29, 1959.

At the Dept of Plant Pathology, Institute of Agriculture, Anand, India, in Nov. 1957, several clean slides, smeared with sap from leaves of *Tradescantia tricolor* [cf. **33**, p. 368] and then dusted with spores of *Tolyposporium penicillariae* collected yearly from 1955–57, were buried at 3, 6, and 9 in. depth. A monthly check,

washing a slide with distilled water and placing it under moist conditions for 48 hr. at 24–28° C., showed that regardless of the year of collection germination of spores buried at 6 and 9 in. was still excellent up to Aug. 1958 but that of spores buried at 3 in. fell after March 1958.

Warcup (J. H.). **Studies on Basidiomycetes in soil.**—*Trans. Brit. mycol. Soc.*, **42**, 1, pp. 45–52, 1959. [20 ref.]

At the Waite Institute, Adelaide, S. Australia, using previous hyphal isolation methods [**37**, p. 147] and dilutions of 1:5,000, nematological flotation methods or sieving to obtain sclerotia, and Waid's root fragmentation method [**36**, p. 341], basidiomycetes from wheat field and pasture soils were identified from the presence of clamp connexions or rhizomorphs, by comparison with cultures of known basidiomycetes, and (for 6 spp.) by fructification in culture (initially on sterile wheat chaff, then placed in pots under damp soil). Dilution and soil plates yielded no basidiomycetes, and no basidiomycete fructifications were found in the wheat field over 3 yr., though isolations (largely from wheat bases) indicated an abundant and varied population of 19 spp. The fruiting spp. found in the pasture did not correspond to those from isolations (16 spp.), mainly from roots.

Rao (A. S.). **A comparative study of competitive saprophytic ability in twelve root-infecting fungi by an agar plate method.**—*Trans. Brit. mycol. Soc.*, **42**, 1, pp. 97–111, 1959. [25 ref.]

This modification of the 'Cambridge method' of Butler and Lucas for the estimation of competitive saprophytic ability [cf. **33**, p. 147; **35**, p. 94] was used at the Botany School, University of Cambridge. Maize meal-sand cultures were mixed with unsterilized Kettering or Cambridge Botanic Garden soil in a series of 6 dilutions (98–10%), and solidified by impregnation with water agar; 4 disks cut from the inoculum-soil mixture were then plated on each of 5 plates of Czapek-Dox+0·05% yeast extract agar at pH 4 and incubated for 10 days. In the fungal growth arising from the disks the inoculant fungus was rated according to the proportion of the whole that it occupied, the ratings of all the disks being totalled. By this method *Fusarium culmorum*, *F. avenaceum*, *F. oxysporum* f. *cubense*, *F.o.* f. *vasinfectum*, *F. caeruleum*, and *Curvularia ramosa* were classed as vigorous saprophytes; *Helminthosporium sativum* [*Cochliobolus sativus*] (isolate 1) and *Macrophomina phaseoli* were intermediate; and *Verticillium dahliae*, *C. sativus* (isolate 2), *Rhizoctonia* [*Corticium*] *solani*, *Fomes annosus*, and *Ophiobolus graminis* were poor. These results agree with former gradings by other methods, except for the poor performance of *M. phaseoli* and *C. solani*. It appears that the method supplies more intense competitive conditions than those associated with natural soil substrates.

Gondo (M.) & Niiyama (S.). **Soil-ecological studies on the soil-pathogens. I. Effect of various soil-factors on the growth of Helicobasidium mompa Tanaka.**—*Bull. Fac. Agric. Kagoshima Univ.* 7, pp. 132–139, 1 fig., 10 graphs, 1958. [Japanese. Abs. from English summary.]

At the Laboratory of Plant Pathology, Kagoshima University, using Rushdis' method [cf. **35**, p. 632], it was shown that the bigger the soil particles the better was the growth of *H. mompa* [cf. **37**, p. 677], but that the best growth was in soil containing a mixture of large and small particles; volcanic ash was the most and clay the least suitable soil. Temps. of 24–30° C. (27° opt.) and 70% R.H. or more (90% opt.) were favourable for growth, which was opt. at pH 6 and decreased as the pH increased. Addition of dried maize or clover leaf powder to the soil increased growth, but addition of K_2SO_4, $Ca(H_2PO_4)_2$, and especially $(NH_4)_2SO_4$, inhibited it.

Iyengar (M. R. S.) & Hora (T. S.). **Nitrite oxidation by soil fungi.**—*Naturwissenschaften*, **46**, 6, p. 211, 1959.

In a further examination [cf. **33**, p. 380] of nitrification at the Indian Agricultural Research Institute it was confirmed that several isolates of *Aspergillus flavus* from Delhi soils were similarly active in media containing peptone as a source of N, while certain strains of *Penicillium* sp. were able to induce nitrate formation in nitrite-containing media only.

The general methods and the basal medium used were the same as Schmidt's [loc. cit.], except that in studies on the *P.* strains the medium was supplemented by $NaNO_2$ as the sole N source at a conc. of 0·05% w/v with an initial pH of 7. On this substrate even the most efficient of the *A. flavus* isolates, which formed about 45 p.p.m. nitrate N by the end of 16 days in the basal medium, yielded only 5 p.p.m. in the same period. On the other hand, 2 *P.* isolates produced over 40 p.p.m. nitrate N in 6 days and 50–60 p.p.m. in 16.

The studies further revealed an unidentified pycnidial fungus approaching the *P.* sp. in its capacity to form nitrite from nitrate and several other organisms with a comparable but weaker aptitude.

Knösel (D.). **Über die Wirkung aus Pflanzenresten freiwerdender phenolischer Substanzen auf Mikroorganismen des Bodens. II. Versuche mit p-Cumarsäure, Ferulasäure, and Vanillinsäure.** [On the action of phenolic substances liberated by plant residues on soil micro-organisms. II. Experiments with *p*-coumaric acid, ferulic acid, and vanillic acid.]—*Z. PflErnähr. Düng.*, **85 (130)**, 1, pp. 58–66, 1 fig., 1 graph, 1959.

In further experiments at the Institut für Pflanzenschutz der landwirtschaftlichen Hochschule, Stuttgart-Hohenheim, Germany [**37**, p. 522], spp. of *Aspergillus*, *Penicillium*, *Fusarium*, *Rhizoctonia*, *Phoma*, *Stemphylium*, *Mucor*, *Rhizopus*, and *Mortierella*, in contrast to streptomycetes and bacteria, proved largely capable of utilizing phenolic substances at concs. of 10^{-2}–10^{-6} g./ml. in pure culture, but in soil samples germination counts were not appreciably influenced by the compounds.

Stotzky (G.) & Mortensen (J. L.). **Effect of gamma radiation on growth and metabolism of microorganisms in an organic soil.**—*Proc. Soil Sci. Soc. Amer.*, **23**, 2, pp. 125–127, 1959.

At Ohio Agricultural Experiment Station samples of Rifle peat were irradiated with γ rays [**38**, p. 352] at doses of 2–250 kiloroentgens (kr.) and incubated for 54 days. Periodical determinations revealed no significant effect on the development of the bacterial population, whereas that of [unspecified] fungi was increasingly inhibited from 8 kr. upwards. Thus, at the 'peak' period of 31 days, the number of colonies fell from $15{\cdot}1 \times 10^4$/g. oven-dry soil in the untreated samples to $2{\cdot}5 \times 10^4$/g. in those receiving the max. dose.

Reháček (Z.). Выделение актиномицетов и определение количества их зародышей в почве. [Isolation of actinomycetes and determination of their number in soil.]—*Microbiology, Moscow*, **28**, 2, pp. 236–241, 1 pl., 1 fig., 1959. [English summary.]

At the Biological Institute of the Czechoslovak Academy of Science, Prague, a method used for the quantitative determination of actinomycetes involved centrifugation of the soil sample at 904 G at the surface and 1609 G at the bottom of the cuvette. Contaminant micro-organisms were concentrated in the surface layer, whereas actinomycetes were in the sediment. On plating, pure actinomycete cultures were obtained in 10 days; prolonged purification of the strains is thus eliminated.

Szabó (I.). **Adatok a Magyarországi talajok sugárgombaflórája antibiotikus aktivitásának ismeretéhez.** [Data on the antibiotic activities of the flora of actinomycetes in the soils of Hungary.]—*Agrokem. es Talaj.*, **5**, 4, pp. 433–456, 1956. [Russian and English summaries. Abs. in *Referat. Zh. Biol., 1958*, 23, p. 70, 1958.]

In all, 34 soils were investigated for correlation between physico-chemical and biological properties and for the antibiotic properties of the micro-organisms isolated, with special emphasis on the actinomycetes. Those from highly lixiviated acid soils possess only slight antibiotic activity, those from cultivated soil have somewhat higher activity, and those from saline were the most active. Actinomycetes from one soil were more active against themselves than against the bacteria from these soils. The ones with the strongest antibiotic activity against actinomycetes multiply most rapidly.

Lanjouw (J.) & Stafleu (F. A.). **Index herbariorum. Part I. The herbaria of the world.**—249 pp., Ed. 4 (Regnum veget., 15); International Bureau for Plant Taxonomy and Nomenclature, Utrecht, Netherlands. 1959. D.fl. 19.

This index has 4 parts: an alphabetical, annotated list of herbaria with their addresses and staff, a list of standard abbreviations of herbarium names, the geographical distribution of herbaria, and an index to personal names.

Vasyagina (Мме М. Р.). Паразитная микофлора мелкосопочника центрального Казахстана. [Parasitic fungal flora of the 'small hills' in central Kazakhstan.] —Труд. Инст. Бот. Казах. Акад. Наук [*Trud Inst. Bot. Kazakh. Acad. Sci.*], **6**, pp. 161–194, 1 map, 1959. [65 ref.]

A description of the natural features of the Karagandin region is followed by a list of 329 spp. and 44 f. of parasitic and saprophytic fungi with their hosts, arranged systematically, and including 18 spp. and 2 f. designated new but not described. Distribution is examined according to ecological regions (steppes, meadows, forests, deserts) and hosts (trees, shrubs, grasses); some of the more important diseases of cultivated and useful wild plants are considered. These include *Pseudoperonospora humuli* [map 14] on hops, *Daldinia concentrica* [cf. **35**, p. 815] on apple and birch trunks, *Lophodermium pinastri* on pine needles [**36**, p. 559], *Pseudopeziza medicaginis* on lucerne [**37**, p. 297], *Fomes fomentarius* on birch [**36**, p. 671], *Septoria* spp. on cereals and grasses, *Ustilago tritici* [*U. nuda*] on wheat, *U. avenae* on oats, *Fusicladium dendriticum* [*Venturia inaequalis*] on apple, and *Taphrina minor* on cherry [cf. **36**, p. 114; **37**, p. 172].

Negru (A.). **Material micologic din Transilvania.** [Mycological material from Transylvania.]—*Contr. bot. Cluj, 1958*, pp. 59–72, 1 fig., 1958. [Russian and English summaries.]

The 27 spp. described include 2 new spp., one, *Diplodia ginkgonis*, occurring on young branches of *Ginkgo biloba*; there are also 14 new records for the country, and the remainder represent new host records. The fungi noted include *Podosphaera* [*oxyacanthae* var.] *tridactyla* f. *padi* on *Prunus* spp., *Microdiplodia juglandis* and *Diplodia juglandis* on walnut, and *Helminthosporium turcicum* on maize.

Crişan (Aurelia). **Cîteva specii de micromicete noi pentru R.P.R.** [Some micromycete species new to the country of R.P.R.]—*Contr. bot. Cluj, 1958*, pp. 73–77, 2 fig., 1958. [Russian and English summaries.]

From different localities in Transylvania 7 micro fungi on cultivated and wild plants are noted, including *Pleosphaerulina briosiana* [*Pseudoplea trifolii*] on lucerne, *Phyllosticta disciformis* on lemon, and *Verticillium buxi* on box.

Káptálan (Margareta C.). **Macromicete din pădurea Hoia.** [Macromycetes in Hoia forests.]—*Contr. bot. Cluj, 1958*, pp. 83–90, 12 fig., 1958. [Russian and French summaries.]

In a 4-yr. investigation in the Hoia forests, near Cluj, Romania, 54 spp. (mostly agarics) were noted, the greatest number being found in oak-hornbeam forest.

Greene (H. C.). **Notes on Wisconsin parasitic fungi. XXIV, XXV.**—*Trans. Wis. Acad. Sci. Arts Lett.*, **47** (*1958*), pp. 99–117; pp. 119–129, 1959.

This list of fungi collected in 1957 and 1958 [cf. **36**, p. 554] includes 77 host and 28 fungus records (including 10 new spp. and 2 new combinations) new for the State. For each a brief description of the pathogen and occasionally disease symptoms are given.

Baxter (J. W.). **Notes on Rocky Mountain rust fungi.**—*Trans. Wis. Acad. Sci. Arts Lett.*, **47** (*1958*), pp. 131–135, 2 fig., 1959.

In the central Rocky Mountains races 3, 4, 8, and a new race (on *Monarda fistulosa* var. *menthaefolia*) were identified among specimens of *Puccinia menthae* [cf. **31**, p. 351; **33**, p. 50] collected in Utah and Wyoming in 1957. Collections of *P. helianthi* on sunflower and *P. xanthifoliae* on *Iva xanthifolia* collected in 1956 and 1957 could not be distinguished readily except on a host basis. Uredospores of the latter infected sunflower in 2 tests. The author suggests that *P. xanthifoliae* should be treated as a var. of *P. helianthi*.

Cunningham (G. H.). **Hydnaceae of New Zealand. II.—The genus Odontia.**—*Trans. roy. Soc. N.Z.*, **86**, 1–2, pp. 65–103, 29 fig., 1959.

In this monograph [cf. **38**, p. 500] 25 spp. are recognized and described in detail, with accompanying notes on distribution, hosts, and comparative features. A diagnostic key to spp. is appended, 14 of which are new. *Hydnum calcareum*, renamed *O. calcarea*, is noteworthy in that it causes a pocket rot, with small, numerous, conspicuous cavities on many coniferous and broad-leaved hosts.

Gilman (J. C.), Tiffany (Lois H.), & Lewis (R. M.). **Iowa Ascomycetes III. Diaporthaceae : Diaportheae.**—*Iowa St. Coll. J. Sci.*, **33**, 3, pp. 325–393, 14 pl. (274 fig.), 1959.

This contribution [cf. **19**, p. 501; **32**, p. 38] contain keys to the 12 genera and to the spp., which are described, and a host index, including a number of plants of economic importance; 27 spp. of *Diaporthe* are included. *D. taleola* and *D. leiphemia* var. *raveneliana* are both widespread on oats in the State. *Cryptodiaporthe salicina* occurs on both *Salix* and *Populus* [cf. **38**, p. 104].

Salam (M. A.) & Rao (P. N.). **Fungi from Hyderabad (India)—II (Oidium spp.).**—*Indian Phytopath.*, **11**, 2, pp. 126–129, 1958.

From the Osmania University, Hyderabad, descriptions are given of 16 *Oidium* spp. (of which only 5 are given specific epithets) collected during the winter of 1955 in the Hyderabad State; 11 are new records for India.

Deighton (F. C.). **Studies on Cercospora and allied genera. I. Cercospora species with coloured spores on Phyllanthus (Euphorbiaceae).**—*Mycol. Pap.* 71, 23 pp., 13 fig., 1959.

Descriptions and a key are given for 6 spp. (3 new) of *Cercospora* on *Phyllanthus*, mainly from African material. Notes on 2 spp. on genera related to *Phyllanthus* are included.

Gremmen (J.). **Taxonomical notes on Mollisiaceous fungi—VI. The genus Pyrenopeziza Fuck.**—*Fungus, Wageningen*, **28**, 1–4, pp. 37–46, 1958.

Following an historical review, the author concludes that *Pyrenopeziza* [**38**, p. 68] takes precedence over *Mollisia*. A key to the sections of the genus based on the receptacle is attempted and the diagnosis is emended; 45 spp. are listed.

Gordon (W. L.). **The occurrence of Fusarium species in Canada. VI. Taxonomy and geographic distribution of Fusarium species on plants, insects, and fungi.** —*Canad. J. Bot.*, **37**, 2, pp. 257–290, 2 fig., 1959. [13 ref.]

In further studies at the Plant Pathology Laboratory, Winnipeg [cf. **36**, p. 553], 18 spp., 3 vars., and 18 f. of *F.* classified in 9 sections were identified. Of these the occurrence in Canada of *F. chlamydosporum* (on blighted heads of durum wheat), *F. heterosporum*, *F. moniliforme* [*Gibberella fujikuroi*] var. *subglutinans*, as well as 14 f. of *F. oxysporum*, and 3 f. of *F. solani* is recorded for the 1st time. The spp. most commonly isolated were *F. oxysporum*, *F. acuminatum*, *F. solani*, *F. avenaceum*, and *F. poae*. *F. oxysporum*, *F. caeruleum*, and *F. sambucinum* f. 6 [*G. cyanogena*] are probably the most important economically, especially the 1st named because its specialized pathogenic forms can be destructive to a wide range of cultivated plants. *F. graminearum* (*G. zeae*) and *F. culmorum* are the most important pathogens of cereals, but *F. avenaceum* (head blight) can also cause considerable damage in wet areas. The possible role of common weeds harbouring *F.* spp. in overwintering and spread is noted.

Nour (M. A.). **Studies on the specialization of Sphaerotheca fuliginea (Schlecht.) Poll. and other powdery mildews.**—*Trans. Brit. mycol. Soc.*, **42**, 1, pp. 90–94, 1959.

In studies at the University of Khartoum, Republic of the Sudan, conidia of *S. fuliginea* [**36**, p. 566] from one host infected hosts of different genera or families in inoculations of cotyledons and 2nd leaves: conidia from vegetable marrow or cucumber infected *Hibiscus esculentus* and vice versa. Similarly, conidia of *Leveillula taurica* [**37**, p. 521] from *H. esculentus* infected broad bean, *Euphorbia heterophylla*, and tomato; back inoculations to *H. esculentus* were positive as were inoculations with conidia from jute (*Corchorus olitorius*) on *H. esculentus*, though not on bean. Results with *Erysiphe umbelliferarum* (*E.* ? *polygoni*) from carrot and bean were negative. Inoculations were mostly successful only when carried out during the cooler months of Dec.–Feb.; in the few successful inoculations in Mar.–May incubation was much longer and the spread slower. *S. fuliginea* and *L. taurica* are prevalent in the field in winter and are rare in summer (April–July): it is believed that any appreciable degree of specialization is not an inherent character, but is probably directly affected, like pathogenicity, by the temp.

Banerjee (S.) & Sarkar (A.). **Spore forms in sporophores of Ganoderma lucidum (Leyss.) Karst.**—*Proc. Indian Acad. Sci.*, Sect. B, **49**, 2, pp. 94–98, 1 fig., 1959.

Fructifications of this fungus, whether collected in the field or grown in culture [**37**, p. 708; **38**, p. 247], produced 'secondary spores' and 'gasterospores' in addition to the normal basidiospores. The 3 types are more or less identical in appearance, but the 'secondary spores' have a less verrucose wall than the other 2, while the 'gasterospores' have 2 opposite notches on the exospore.

Sarkar (Anjali). **Spore-germination of Ganoderma lucidum (Leyss.) Karst.**—*Sci. & Cult.*, **24**, 11, pp. 524–525, 1 fig., 1959.

At the Botany Dept, University College of Science, Calcutta, spores of *G. lucidum* [**22**, p. 334 and above] obtained from fresh fruit-bodies collected from nature and

also from sporophores produced in culture germinated only on malt agar and potato dextrose agar, germination being very low (1–2%). Secondary spores, however, were generally shed from the fruit-bodies when they were still thin walled, hyaline, and without any evident endospore. In this condition they germinated readily (about 95%); if shed at a later stage they were more mature, thick-walled, and verrucose, and germination was also very low. An immature secondary spore always produced a single germ-tube from any part of the spore-wall, which did not branch before attaining 20–30 μ length, whereas basidiospores germinated only apically and often branched immediately.

VANTERPOOL (T. C.). **Oospore germination in Albugo candida.**—*Canad. J. Bot.*, **37**, 2, pp. 169–172, 1 pl., 12 fig., 1959.

A type of oospore germination in *A. candida* different from the usual sessile vesicular zoosporangial type is described from the University of Saskatchewan, Saskatoon. The length of the exit tube is 1–2½× the oospore diam. and about ¼ of its width and bears the vesicular zoosporangium at its end. Best results were obtained by soaking the oospores (from hypertrophied inflorescences of rape (*Brassica napus* var. *annua*)) for 7 to 10 days in water at 10–12° C. and then changing to fresh water.

HALL (ANGELA M.). **The culture of Phytophthora infestans in artificial media.**—*Trans. Brit. mycol. Soc.*, **42**, 1, pp. 15–26, 1959.

In studies at the Botany School, Cambridge, the growth of single spore isolates of race 2,4 of *P. infestans* on French's liquid medium [**33**, p. 375; **38**, p. 447] varied considerably. It was best at pH 5·5 and was increased by the presence of yeast and vitamin growth factors, though these were not essential; 2·5% (w/v) D-glucose with asparagine to give 0·02% N was as effective as any other sugar used; reduction of N to 0·05% suppressed growth almost entirely. There was shown to be an interaction between N conc. and the size of the initial inoculum (density of spore suspension) necessary to establish growth. Prolonged autoclaving (20 min. at 10–15 lb.) of a mixture of glucose and asparagine gave rise to a compound which decreased or even suppressed growth on the minimal medium (basal+asparagine at 0·02% N), even with yeast extract added, and is probably formed in small amounts even with normal autoclaving (5 min. at 10 lb.). This medium is considered suitable for genetical work provided a mass inoculum from each survivor of irradiation is used, to ensure that nutritionally deficient mutants are not overlooked.

VASUDEVA (R. S.), IYENGAR (M. R. S.), BAJAJ (B. S.), & CHATRATH (M. S.). **Mutation in Colletotrichum falcatum Went, the causal agent of red rot of Sugarcane. I. Induced by beta radiation.**—*Indian Phytopath.*, **11**, 2, pp. 91–95, 4 fig., 1958.

At the Indian Agricultural Research Institute, New Delhi, a stable mutant of *C. falcatum* [*Glomerella tucumanensis*: **36**, p. 499] was obtained when it was grown on a liquid medium containing radioactive P^{32} with an initial activity level of about 240 μc/ml. The mutant resembles the well-known dark type of the fungus with less sporulation and smaller spores, measuring 9–21·6×4·4–7·2 (mostly 14·4–18×5·4–6·3) μ compared with the normal 21·6–28·8×4·4–5·4 (mostly 23·4–27×4·5–5·4) μ; they also varied in shape.

CHATTOPADHYAY (S. B.) & DAS GUPTA (MISS C.). **Saltation in Helminthosporium oryzae Breda de Haan.**—*Indian Phytopath.*, **11**, 2, pp. 144–149, 1 pl., 1958.

In the study of 23 isolates of *Cochliobolus miyabeanus* from W. Bengal at the State Agriculture Research Institute, Calcutta, it was found that they could be divided into 4 distinct groups on the basis of size, manner of appearance, and distribution

of the saltant areas [**10**, p. 541] developing at 26° C., the opt. temp. for saltation. At 31° it was irregular and the areas were ill-defined, at 36° practically absent, and at 21° rather infrequent. It was more pronounced on maize meal and oatmeal agars than on Richards's. Conidial production was practically absent in typically saltant areas. The very few conidia produced in a loose saltant area were smaller, 32·3–91·2×7·6–13·4 (av. 62·7×11·4 μ) with up to 7 septa (av. 5) than normal, 34·47–158·95×7·66–17·24 μ (up to 12 septa). Reversion of saltant growth to the parental dark grey mycelial form occurs gradually at 21° on repeated subculturing, but at 26° complete reversion does not take place, even after a number of generations in subculture.

Baldacci (E.). Расширение классификации Актиномицетов. [Extension of the classification of Actinomycetes.]—*Microbiology, Moscow*, **28**, 2, pp. 274–286, 1959. [English summary.]

From the Plant Pathology Institute, University of Milan, Italy, a key to the genera of actinomycetes is presented [cf. **38**, p. 398], based on the structure of the sporophores and on the number of spores on them [cf. **38**, p. 497]. A new genus, *Streptoverticillium* (for which there is a key to the series), contains species with spores in verticils.

Jones (K. L.) & Liu Chen (Pearl). **Observations on structure of Streptomyces by means of electron microscope.**—*Pap. Mich. Acad. Sci.*, **44** (*1958*), pp. 141–151, 25 fig., 1959.

Results are presented of an electron microscope study on spore forms of *Streptomyces* [cf. **37**, p. 459] raised on different media. Nuclear studies are also being undertaken.

Singh (R. K.). **A convenient method of storage of fungal cultures.**—*Indian Phytopath.*, **11**, 2, p. 186, 1958.

At the Central Sugarcane Research Station, Pusa, Bihar, cultures of *Fusarium moniliforme* [*Gibberella fujikuroi*], *F. caeruleum*, and *F. avenaceum* in a soil medium [cf. **26**, p. 218]+1% glucose stored at —18° C. remained viable and unchanged for over 2 yr.

Butler (E. E.) & Mann (Margery P.). **Use of cellophane tape for mounting and photographing phytopathogenic fungi.**—*Phytopathology*, **49**, 4, pp. 231–232, 1 fig., 1959.

At the University of California, Davis, a strip of adhesive tape 2 cm. wide and the length of a slide is used to remove fungi from plant or agar by pressing it on the surface and then drawn tightly over a drop of lactophenol on the slide [cf. **36**, p. 46], being fixed to the slide at either end. For microphotographs the tape is stretched on the slide with the adhesive surface up (secured at each end with additional strips) and the adhering fungus mounted in lactophenol under a cover slip.

Keyworth (W. G.). **A modified La Rue cutter for selecting single spores and hyphal tips.**—*Trans. Brit. mycol. Soc.*, **42**, 1, pp. 53–54, 1 pl., 1959.

This modification of the La Rue cutter for attachment to a microscope nosepiece (*Bot. Gaz.*, **20**, pp. 319–320, 1920) embodies the use of easily removable cutting tips, facilitating their sterilization. It is obtainable from I. Saint, 50 Clarendon Avenue, Leamington Spa, Warwick.

Schaal (L. A.) & Dirrell (L. W.). **A simplified method of isolating single cells of Streptomyces.**—*Amer. Potato J.*, **36**, 4, pp. 137–139, 3 fig., 1959.

In this technique, a modification of that of Andersen *et al.* [**26**, p. 167], a small

quantity of cells of *S. scabies*, taken by needle from the surface of an old colony with max. aerial growth, is placed in 10 ml. of sterile water containing a small quantity of sodium lauryl sulphate, and shaken vigorously for 20–30 sec. After 3 serial dilutions (0·5:10 ml.) 0·5 ml. is pipetted on to modified potato dextrose agar plates and spread evenly over the surface. The resulting colonies then originate from single cells.

KLINKOWSKI (M.). **Pflanzliche Virologie. Band I. Einführung in die allgemeinen Probleme. Band II. Die Virosen des europäischen Raumes.** [Plant virology. Vol. 1. Introduction to general problems. Vol. 2. Viroses of the European region.]—x+279 pp., 100 fig., 3 graphs; vii+393 pp., 251 fig., Berlin, Akademie Verlag, 1958. D.M. 33 & 48.

This useful, well-presented, and copiously illustrated work contains contributions from leading scientists in both E. and W. Germany. In Vol. 1 an introduction by M. KLINKOWSKI is followed by a general section with contributions from H. A. USCHDRAWEIT, on symptomatology; K. SCHMELZER, modes of transmission; J. VÖLK, insect transmission and the relationship between virus and insect; H. A. USCHDRAWEIT, host-virus relationship; O. BODE, biophysical properties of plant viruses; H. WOLFFGANG, biochemical properties of plant viruses; O. BODE, morphology and structure of virus particles and inclusion bodies; R. BERCKS, serology; O. BODE, variability of plant viruses; G. BAUMANN, classification and nomenclature; K. SCHMELZER, demonstration of viruses; and M. KLINKOWSKI, control. Added as an appendix (C. SCHADE, pp. 221–263) is a practical laboratory manual for class work, comprising general hints, and directions for experiments (requiring no special apparatus) illustrating transmission techniques, changes in the infected plant, diagnostic procedures, quantitative demonstration of viruses, virus inactivation and inhibition of infection, and the therapy of virus diseases. Detailed bibliographies are omitted on the grounds that such information is readily available in standard reference works, a few of which are listed.

Vol. 2 is intended as a practical manual of the plant virus diseases known in Europe, and is therefore arranged for convenience under hosts. In most accounts of individual diseases there are subsections on synonymy, symptoms, host range, properties of the virus, transmission, suitable test plants, control, and distribution. No bibliographies are given, and the host lists for individual viruses are frequently incomplete when such information is available elsewhere. O. BODE contributes the section on viroses of potato and tobacco; M. KLINKOWSKI, *Beta* and *Brassica* spp.; L. QUANTZ, legumes; M. KLINKOWSKI, vegetables; H. A. USCHDRAWEIT, tomato; G. BAUMANN, pome, stone, and berry fruits; M. KLINKOWSKI ornamentals; and M. KLINKOWSKI other viroses. On pp. 287–320 K. SCHMELZER lists, under alphabetical order of the German, English, and Latin names, all host plants mentioned in the text. There is also, on pp. 336–340, a list, provided by J. VÖLK, of aphid vectors, with synonyms. Each volume has a separate subject index.

THORNBERRY (H. H.). **Publications relative to viral diseases of plants from 1900 to 1956.**—*Plant Dis. Reptr*, **43**, 3, pp. 371–373, 1 graph, 1959.

A statistical survey is given of the numbers of scientific papers devoted to virology as determined from the *Exp. Sta. Rec.* 1900–1946 and *R.A.M.* 1947–1956; it shows a steady increase of those on virus diseases, which amounted to 33·2% of all papers on plant diseases in 1956.

STUBBS (L. L.). **Plant virology in Australia.**—*J. Aust. Inst. agric. Sci.*, **25**, 1, pp. 11–17, 1959. [38 ref.]

After pointing out that the importance of plant virus diseases is still not fully recognized in Australia, the author reviews and discusses the subject, with numerous

references to the relevant literature, under the following headings: the recognition of virus disorders; the dissemination of viruses; nomenclature and classification; and morphology, chemistry, and structure.

Brandes (J.) & Wetter (C.). **Classification of elongated plant viruses on the basis of particle morphology.**—*Virology*, **8**, 1, pp. 99–115, 2 fig., 2 graphs, 1959. [59 ref.]

Particle length is the most useful feature for characterizing an elongated plant virus. With the exudate method for electron microscope preparations, 60–80% of all measured particles usually show specific, favoured lengths. The characteristic length value, calculated as the arithmetical mean from the main max., is the 'normal length', particles of this length being, apparently, the infectious units.

The authors arrange 39 elongated viruses in 12 groups according to their normal lengths. Distinct viruses in one group may or may not be related serologically. Such characteristics as diam., shape, thermal inactivation point, and mode of transmission show correlations in each group and suggest other systematic units into which viruses with different normal lengths may be combined.

Crowley (N. C.). **Studies on the time of embryo infection by seed-transmitted viruses.**—*Virology*, **8**, 1, pp. 116–123, 1959. [14 ref.]

In further studies at the University of Adelaide [**37**, pp. 268, 269] Early Red Valentine kidney and Pinto beans (*Phaseolus vulgaris*) and soybeans were inoculated with bean southern mosaic virus, Lincoln tobacco and 3 vars. of soybeans with tobacco ring spot virus, and Mars and Compana barley and Selkirk wheat with barley stripe virus. The viruses were all able to infect embryos both by infecting the gametes and by infecting the embryo, but only during the early stages of its development. These results support the view that the absence of seed transmission of some highly infectious viruses may be due to their inability to infect and survive in the young gametophytic and meristematic tissues.

Heinze (K.). **Verlängerung der Haltbarkeit eines nicht persistenten phytopathogenen Virus am Überträger durch Kälteeinwirkung.** [Prolongation of the viability of a non-persistent phytopathogenic virus in the vector through the action of cold.]—*Naturwissenschaften*, **46**, 9, pp. 329–330, 1959.

At the Institut für gärtnerische Virusforschung, Berlin-Dahlem, *Myzodes* [*Myzus*] *persicae*, starved for 4 hr., were allowed to feed for 5–10 min. on a turnip plant infected by turnip mosaic virus [**36**, p. 628; **38**, p. 376, *et passim*]. After exposure for periods of 16–96 hr. to a temp. of −1° C. on damp blotting paper in Petri dishes they were placed in batches of 10–15 on 10 test plants. After 16 hr. cold the virus was transmitted to 8 plants, after 24 and 48 to 5, after 56 to 4, after 64 to 2, after 72 and 80 to 4, and after 96 to 2. Cold treatment at −6° proved less favourable to the protraction of transmissibility; 32 hr. was the max. withstood by any of the aphids, and many had already lost their capacity for transmission by this time; after 6 hr. 7 out of 10 plants contracted infection, after 16 none, after 24, 3, and after 32, 1.

Townsley (P. M.). **The electrophoretic analysis of plant virus preparations.**—*Canad. J. Biochem. Physiol.*, **37**, 1, pp. 119–126, 2 fig., 1 graph, 1959.

At the Canada Dept Agric., Vancouver, B.C., zone electrophoresis in agar gel has been used for the separation of tobacco mosaic virus and potato virus X from crude plant extracts and reaction mixtures. The viruses were located within the matrix by autoradiographic, serological, and protein-staining methods.

Radio-active phosphate (P^{32}) appears to be rapidly incorporated into a particle of large molecular weight, probably tobacco mosaic virus. The tobacco mosaic

virus band was found to be labelled within 2 hr. of uptake by young Haronova tobacco leaves. The occurrence in ultracentrifuged preparations of P^{32} activity which was unstable on exposure to citrate ions is thought to have been derived from contaminating normal nucleoprotein, and not from an unstable particle combined with or electrophoretically related to tobacco mosaic virus.

Van der Veken (J. A.). **Onderzoekingen over de zuivering van Cucumis virus 1 st. Chr. uit Tabak.** [Studies on the purification of *Cucumis* virus 1 Chr. str. from Tobacco.]—*Tijdschr. PlZiekt.*, **64**, 5–6 (Van Slogteren Nummer), pp. 470–474, 1958. [English summary.]

At the Laboratorium voor Bloembollenonderzoek, Lisse, Netherlands, partially purified preparations of the chrysanthemum strain of *Cucumis* virus 1 [cucumber mosaic virus: **32**, p. 559] were obtained from White Burley tobacco by extraction with 0·8% NaCl, ultracentrifugation, and removal of the normal nucleoproteins, to which it is firmly bound, by incubation in citrate buffer at pH 6.

Valenta (V.). **Pokusy s tepelnou inaktivácion niektorých evropských žltačkových vírusov in vivo.** [Experiments on thermal inactivation of some European yellows viruses *in vivo*.]—*Biologia, Bratislava*, **14**, 2, pp. 146–149, 1959. [Russian and English summaries.]

At the Virological Section of the Czechoslovak Academy of Science, Bratislava, preliminary experiments with periwinkle (*Vinca rosea*) infected by [tomato] stolbur virus, clover phyllody [strawberry green petal] virus, and Crimean yellows virus [**38**, p. 135] showed that the 1st was inactivated at 43±1°, 43·5±0·5°, and 40±2° C. for 4, 5, and 6 days respectively, the 2nd under the same conditions and also at 39·5±0·5° for either 4 or 6 days, but plants infected by the Crimean yellows virus did not show even a transient recovery from disease symptoms after similar treatment.

Garga (R. P.). **Studies on virus diseases of plants in Madhya Pradesh II. A new strain of Datura virus 3.**—*Indian Phytopath.*, **11**, 2, pp. 133–136, 2 fig., 1958.

A virus disease of *Datura inoxia* described from the Dept of Botany, Holkar College, Indore, India, is characterized by extreme reduction of the leaf lamina to filiform leaves and partial or total suppression of spines on the fruits. Easily transmissible by mechanical means but not seed-borne, the virus has a very limited host range, having been transmitted only to *Petunia* sp. in addition to *D. inoxia*. It has a dilution end point of 1:100, thermal inactivation point of 55° C., and longevity *in vitro* of 4–5 days at 24–27°. The symptoms of this virus greatly resemble those produced by *Datura* distortion mosaic virus [**32**, p. 627] on *D. inoxia* but differ in the partial or total suppression of spines on the fruit. Also the latter virus has a higher inactivation point (62°), a much higher dilution end point (above 1:10,000), retains infectivity for longer period (13 days), and infects tobacco and tomato [cf. **35**, p. 280]. It is proposed to designate the new virus *Datura* virus 3A.

Some results of low-volume spraying of Cocoa.—*J. agric. Soc. Trin. Tob.*, **58**, 3, pp. 359–360, 1958.

At a meeting of the Society in Aug. 1958, L. de Verteuil stated that in the course of trials against black pod of cacao (*Phytophthora palmivora*) significant increases in yield were obtained with perenox [cf. **37**, p. 636] at 1½ lb./acre in 3 gal. water, applied every 4 weeks (increases of 30–43%) and at 3 lb./acre in 2 gal. every 4 weeks (24%). Urea at 1·8 lb./acre in 2 gal. water, applied with the former in 2 gal. water, gave an increase of 42% or 164 lb./acre. The cost of this double spraying, 12 monthly applications, was $25 [W.I.]/acre, but planters could probably manage it more cheaply. It is possible that the same results could be obtained by spraying

for 6 months only. No worthwhile increases were obtained with orthocide, zerlate [cf. **38**, p. 193], or copper oxychloride, in water or oil, or with orchard oil alone.

Wharton (A. L.). **Development and application of chemical control methods against black-pod disease (Phytophthora palmivora) in West Africa.**—*W. Afr. J. biol. Chem.*, **1**, pp. 111–117, 1958. [Abs. in *Chem. Abstr.*, **53**, 9, col. 8513 d, 1959.]

This information from the W. African Cocoa Research Institute, Tafo, Ghana, has been noticed [**37**, p. 464 *et passim*].

Ceratostomella disease in Cocoa. Preliminary observations on a wilt condition of Cocoa.—*J. agric. Soc. Trin. Tob.*, **58**, 3, pp. 265–267; pp. 349, 351, 353, 355–359, 1958.

The 1st article is an editorial comment on the 2nd, the substance of a talk given by J. A. Spence & E. R. Moll at the Society's monthly meeting in Aug. 1958. The sporadic outbreaks of combined attack by shot-hole borer (*Xyleborus* sp.) and *Ceratostomella* [*Ceratocystis*] *fimbriata* on cacao in Trinidad [**38**, p. 298] are considered unlikely to develop into an epidemic, because of the local climatic conditions, wetter than those in the S. and Central American regions where the disease is prevalent [**37**, p. 222]. There is evidence that Criollo types are more susceptible than the Forastero and Trinitario types mainly grown in Trinidad [cf. **37**, p. 271], but the extent of resistance in the Trinidad vars. is unknown; ICS 1 has proved susceptible in Ecuador. The fungus, which has been present in Trinidad for many years, may enter into a virulent phase. The disease has been found in all cacao-growing areas in the Colony, and strict adherence to phytosanitary measures is recommended.

There is a more or less consistent pattern of symptoms, the first and most obvious of which is the rapid onset of a complete wilt of a main branch or a whole tree. Apparently healthy trees sometimes have quite extensive damage to bark and wood without any wilting, which suggests that this comes at the end of a process unobserved for some time. In killed trees dead bark completely encircles the base of the trunk to perhaps 6 in. above ground level, where a light brown to chocolate coloured zone spreads through the wood in advance of the area of dead bark and fades into streaks extending upwards and downwards. Borer attack follows close behind the extremities of the discoloured streaks; often, dead bark, discoloured wood, and shot-holes all originate where a branch has been removed or other damage has occurred.

E. R. Moll briefly indicated the current situation in Colombia as observed during a visit in 1958. It was serious only where trees were in poor shape and damaged in some way.

Orellana (R. G.). **Cushion gall of Cacao in Ceylon.**—*F.A.O. Pl. Prot. Bull.*, **7**, 4, pp. 53–54, 1 fig., 1959.

Cushion-gall or buba disease of cacao [**35**, p. 663] was found on a large estate in the district of Kandy, the most important cacao-growing area of Ceylon. The condition was first seen on a few 8 yr.-old trees of the Trinitario-complex type, planted in an area 100 m. diam. Tamil labourers reported having seen a similar condition on peasant farms in S. India.

Pady (S. M.) & Johnston (C. O.). **Cereal rust aerobiology and epidemiology in Kansas in 1958.**—*Plant Dis. Reptr*, **43**, 6, pp. 607–612, 1 graph, 1959.

Though spore showers were frequent, they were of low content, and wheat infection by leaf rust (*Puccinia recondita*) [*P. triticina*] and stem rust (*P. graminis*) was light (0·5% loss and none, respectively). Stripe rust (*P. glumarum*) again appeared [**37**, p. 469] and caused an estimated 1% loss. Except for about 1% loss caused by leaf rust [*P. recondita*] on rye [**38**, p. 591] rust damage to other cereals was negligible.

Hsi (C. H.). **New records of plant diseases in New Mexico.**—*Plant Dis. Reptr.* **43**, 5, p. 595, 1959.

Stripe rust of wheat [*Puccinia glumarum*: map 97] was recorded on hard red winter wheats; Wichita, Tenmarq, Weston, and Concho were susceptible, Turkey, Cheyenne, and Aztec highly resistant.

Head smut of sorghum [*Sphacelotheca reiliana*: map 69] was found causing severe infection on RS 610, Amak R10, and Combine 7078.

Machacek (J. E.). **Co-operative seed treatment trials—1958.**—*Plant Dis. Reptr*, **43**, 3, pp. 343–347, 1959.

In this annual review [cf. **37**, p. 527] the results are presented of tests with 19 new or comparatively new dressings against wheat bunt (*Tilletia foetida* and *T. caries*) [**38**, p. 403], loose and covered smuts of oats (*Ustilago avenae* and *U. kolleri* [*U. hordei*]), covered smut of barley (*U. hordei*), and [unspecified] seed rot of flax resulting from threshing injury. In the plot test all but 1 of the dressings gave good control of wheat bunt, none gave good control of oat smut, the effect on the other 2 diseases being variable. Oat seed inoculation with smut spores applied by the partial-vacuum method resulted in much smut even when the seed was treated with usually effective dressings.

McEwan (J. M.). **The Wheat varieties of New Zealand.**—*Bull. N.Z. Dep. sci. industr. Res.* 131, 36 pp., 10 pl., 1959.

Detailed descriptions are given of 11 wheat vars. at present in use or soon to be introduced in New Zealand. Reaction of each var. to stem and leaf rusts (*Puccinia graminis* and *P. triticina*), mildew (*Erysiphe graminis*), to which Dreadnought shows mature-plant resistance, *Septoria* leaf blotch (*S. tritici*), eyespot (*Cercosporella herpotrichoides*), and loose smut (*Ustilago tritici* [*U. nuda*]), from which College Hunters is immune, are noted. Information concerning resistance to take-all (*Ophiobolus graminis*), sharp eyespot (*Rhizoctonia* [*Corticium*] *solani*), and *Fusarium* [cf. **29**, p. 15] and *Pythium* spp. is at present lacking. Mildew-resistant lines of Cross 7 and Hilgendorf are being increased.

Schmitt (C. G.), Kingsolver (C. H.), & Underwood (J. F.). **Epidemiology of stem rust of Wheat. I. Wheat stem rust development from inoculation foci of different concentration and spatial arrangement.**—*Plant Dis. Reptr*, **43**, 6, pp. 601–606, 4 diag., 3 graphs, 1959.

At Fort Detrick, Frederick, Maryland, foci of race 56 of *Puccinia graminis* [cf. **38**, p. 195] were established in the spring of 1955 by replanting greenhouse infected plants (lifted from the plots earlier), trimmed to carry a known number of rust pustules, in the centre of 3 circular plots of Thorne winter wheat, each 400 ft. diam.; 12 in. of crop row in plot 1 contained 30 pustules, in plot 2 900 pustules, and in plot 3 30 12-in. crop row units, each with 30 pustules, were planted equidistantly in a 6-row, 5-column pattern within a circle of radius 20 ft. Pustules were counted on 20 culms at fixed points 20–160 ft. from the centre on 24 radii in each plot [cf. **37**, p. 657].

The earliest rust development followed the prevailing wind, increase being most rapid in plot 3 and least in 1. The degree of increase was not directly proportional to the number of pustules in the focus, and it appears that small infection foci scattered over a field would cause more damage than a few large foci.

Joshi (L. M.) & Kak (D.). **Certain morphological peculiarities in races 34 and 75 of Puccinia graminis (Pers.) Erikss. & Henn.**—*Indian Phytopath.*, **11**, 2, pp. 194–196, 1958.

A study at the Indian Agricultural Research Institute, New Delhi, disclosed that

race 34 forms Sudan to amber brown pustules and has uredospores with an av. length of 14·4–25 × 4·7–8 μ, 3–4 μ shorter than those of other races; race 75 has an incubation period more than 1½ times longer than any other race, and also produces non-erumpent pustules.

Farkas (G. L.) & Ledingham (G. A.). **The relation of self-inhibition of germination to the oxidative metabolism of stem rust uredospores.**—*Canad. J. Microbiol.*, **5**, 2, pp. 141–151, 2 graphs, 1959. [36 ref.]

In studies at the National Research Council of Canada, Prairie Regional Laboratory, Saskatoon, Saskatchewan [cf. **37**, p. 347], the O uptake of stem rust [*Puccinia graminis*] uredospores under self-inhibiting conditions [**35**, p. 172; **38**, p. 195] declined rapidly; respiration is based mainly on a fatty acid oxidation, apparently by-passing the Kreb's cycle (malonate insensitivity) [**38**, p. 402], and the enzymes of carbohydrate breakdown are more or less inactive. Compounds which overcome self-inhibition [cf. **37**, p. 274] reverse this picture. Germination and concomitant activation of carbohydrate metabolism followed longer incubation with stimulants, the activity of which (e.g. pelargonaldehyde) was reproduced by the administration in the substrate of suitable respiratory material such as butyrate and propionate. The consequent stimulated respiration appears to be a prerequisite for germination. The initial lipid type of metabolism in the rust uredospore apparently changes to a carbohydrate type of metabolism during germination and this enables the rust to benefit from the stimulated carbohydrate accumulation and breakdown in the host.

Wang (D.). **Effect of benzimidazole, dimethylbenzimidazole, glucose, and metal ions on the development of Puccinia graminis tritici on detached leaves of Khapli Wheat.**—*Canad. J. Bot.*, **37**, 2, pp. 239–244, 1959.

In further studies at the University of Manitoba, Winnipeg [**37**, p. 654; **38**, p. 194], it was shown that the effect of benzimidazole can be nullified by 5,6-dimethylbenzimidazole, which acts as an antagonist, or by an exogenous supply of glucose, which may form a glucoside with benzimidazole. The lack of a close correlation between the effectiveness of increasing conc. of benzimidazole in overcoming the glucose effect points to the possible involvement of other factors. Furthermore, resistance can be restored by the Co ion in solution with glucose+benzimidazole or +5,6-dimethylbenzimidazole, but not by Co alone or combined with glucose, or by the other compounds separately. It is suggested that benzimidazole or some derivative of it and Co may form a vitamin B_{12}-like factor which is required by the host for normal metabolism.

A proposed modification of the system of Wheat leaf rust race identification and nomenclature.—*Plant Dis. Reptr*, **43**, 6, pp. 613–615, 1959.

These proposals, put forward by a committee of N. American wheat leaf rust (*Puccinia recondita*) [*P. triticina*] research workers, suggest augmenting the standard differential vars. with others; the 16 vars. being tested for this purpose are tabulated. A revised system of nomenclature is also envisaged, a race being designated by (1) a number based on the reaction of the 8 standard differentials, (2) an indication of the supplementary differentials used by letters denoting the region of their acceptance, and digits giving the year in which the list of such vars. was published, (3) a number in a consecutive series to indicate a rust culture producing certain specific reactions on the supplementary differentials. Examples are given.

Forsyth (F. R.) & Peturson (B.). **Control of leaf rust of Wheat with inorganic nickel.**—*Plant Dis. Reptr*, **43**, 1, pp. 5–8, 1959.

At Winnipeg, Manitoba, the hexahydrates of nickel chloride and nickel nitrate

[cf. **38**, p. 506] applied to Thatcher wheat at 0·6–1 lb./acre in 66 gal. water eradicated *Puccinia rubigo-vera* [*P. triticina*], increased yield by 8–21%, and caused no phytotoxicity. The compounds are therapeutic and thus independent of weather conditions; when weed-killer equipment is used cost is low; a further advantage is the long storage life of the salts. Two or 3 sprays at 7- or 8-day intervals from the moment a trace of rust is noticed should give reasonable control of leaf rust and presumably also of stem rust (*P. graminis*).

Hassebrauk (K.). **Recent epidemics of stripe rust of Wheat.**—*F.A.O. Pl. Prot. Bull.*, **7**, 4, pp. 49–52, 1959. [27 ref.]

After noting the world-wide distribution of wheat stripe rust (*Puccinia glumarum*), the author discusses the occurrence of unusual outbreaks of the disease in recent years in areas with various climatic conditions, including England [cf. **32**, p. 617], Netherlands [cf. **36**, p. 580; **37**, p. 81], Switzerland [cf. **35**, p. 93], Egypt [cf. **38**, p. 196], the Far East [cf. **36**, p. 580; **37**, p. 226], and recent epidemics in different parts of the United States [cf. **38**, p. 506]. It is concluded that these outbreaks cannot be explained on a basis of climatic conditions and varietal susceptibility; it is possible that new races have developed, but proof of this is difficult to obtain.

Purdy (L. H.). **Residual activity of three fungicides applied to the soil for bunt control.**—*Plant Dis. Reptr*, **43**, 1, pp. 9–11, 1959.

At Washington Agricultural Experiment Station, Pullman, the percentage of bunt (*Tilletia caries*) [**38**, p. 403] developing on Red Bobs and Orin wheat sown in treated, inoculated plots was used as a measure of the residual effectiveness of 3 fungicides. Anticarie at 2½ and 5 lb./acre was ineffective after 6 months, while 20 lb./acre was effective (trace only) for 6 but not for 12 months. Panogen 15 and terraclor were not effective after 6 months at the rates tested.

Tropova (Мме А. Т.). Влияние температуры воздуха на интенсивность заражения зерна яровой Пшеницы **Helminthosporium sativum P., K. et B.** [The effect of air temperature on the intensity of spring Wheat seed infection by *Cochliobolus sativus*.]—Сб. Ин-та прикл. Зоол. Фитопат. [*Sborn. Inst. prik. Zool. Phytopath. 1958*, 5, pp. 195–205, 1958. [Abs. in *Referat. Zh. Biol., 1959*, 9, p. 210, 1959.]

The opt. temp. for germination of conidia taken from 8-day cultures on potato dextrose agar was 24–28° [C.]. The depth of colour [**38**, p. 354] is connected with conidial age and changes with temp. during growth. Growth was most rapid at 30–32°, but was more vigorous at 28° [cf. **37**, p. 344].

Šķipsna (J.). **Pētījumi par ziemāju sniega pelējumu—Tifulozi (Typhula itoana Im., Typhula idahoensis Remsb.) un tās apkarošanu ziemas kviešu sējumos Latvijas PSR rietumu joslas rajonos.** [Investigation on the snow moulds causing typhulosis (*T. itoana*, *T. idahoensis*) and their control in Wheat fields in the west regions of the Latvian S.S.R.]—*Augsne Raža, Riga*, **7**, pp. 221–239, 4 fig., 1958. [Abs. from Russian summary.]

Laboratory investigations at the Steudes Selection Experiment Station during 1947–56 into the causes of considerable degeneration and loss of winter wheat in the Talsi, Kandava, Kuldīga, and Aizpute regions of the Kursemi zone showed that *T. itoana* [cf. **34**, p. 634] and *T. idahoensis* [cf. **34**, p. 89] were widespread, though the grain was treated before sowing. Other fungi, including *Fusarium nivale* [*Calonectria nivalis*], may take an active part in the development of moulding under snow.

The effect of different factors on the development of snow mould and the measures for control were also investigated. Eradication of other hosts (*Poa* spp., and

other grasses and weeds), as well as prophylactic and agrotechnical measures for control, and introduction of resistant vars. are recommended.

Sharp (E. L.). **Two previously unreported fungi on cereals in Montana.**—*Plant Dis. Reptr*, **43**, 1, pp. 12–13, 1959.

Among the pathogens isolated from cereals affected by root and foot rots in Montana in 1957 and 1958 were *Cercosporella herpotrichoides* [map 74] (wheat and barley) and *Cephalosporium gramineum* (wheat).

Tsŷmbal (M. M.). Влияние орошения на поражаемость яровой Пшеницы и Ячменя пылной головней. [The effect of irrigation on loose smut of spring Wheat and Barley.]—*Agrobiology, Moscow, 1959*, 3, pp. 450–452, 1959.

At the All Union Scientific Maize Research Institute, Dnepropetrovsk, U.S.S.R., tests in 1954 and 1955, with seed of Artemovka and Melyanopus 37 spring wheat infected by *Ustilago tritici* [*U. nuda*] and Grushovskiĭ and Odeskiĭ 14 barley with *U. nuda*, showed that disinfection by heat (45° [C.] for 2½ or 3 hr.) before sowing in the autumn and irrigating with 1,500 cu. m./ha. water, gave complete control [**38**, p. 194], compared with 7·2 and 9·4% infection, respectively, in the non-irrigated untreated control. Exposing the seed for 2 days to sun heat, followed by similar irrigation, also brought about a decrease of smut, but not full control.

Hooker (A. L.). **A non-parasitic leaf spot of Oats.**—*Plant Dis. Reptr*, **43**, 3, pp. 337–342, 2 fig., 2 graphs, 1959.

Field and greenhouse observations by the U.S. Dept Agric. and Wisconsin Agricultural Experiment Station, Madison, in 1956 and 1957 on several oat vars. affected by 'non-parasitic' leaf spots [cf. **23**, p. 479] and on others used as checks indicated that these spots develop on certain vars. as the result of specific environmental changes, e.g. from cool and moist to warm and dry, particularly when rapid drying of water-congested leaf tissue occurs. Not all vars. expressing the disorder in the field were similarly affected in the greenhouse, so other factors may be involved.

Morey (D. D.). **Reaction of Rye varieties to leaf rust.**—*Plant Dis. Reptr*, **43**, 5, pp. 578–579, 1959.

At the University of Georgia Experiment Station, Tifton, of 75 foreign and 31 N. American rye vars. or selections tested in the greenhouse against a local collection of *Puccinia recondita* only selections from Gator [**37**, p. 700] approached this var. in resistance and all but 6 of the foreign vars. were completely susceptible.

Cammack (R. H.). **Studies on Puccinia polysora Underw. II. A consideration of the method of introduction of P. polysora into Africa. III. Description and life cycle of P. polysora in West Africa.**—*Trans. Brit. mycol. Soc.*, **42**, 1, pp. 27–32; pp. 55–58, 1959.

Before its appearance in W. Africa in 1949 [**37**, p. 656; cf. **38**, p. 514] *P. polysora* was confined to the Caribbean area. Introduction by sea is considered unlikely as all attempts to induce seed-borne infection experimentally failed and the known viability of the uredospores makes survival of a sea voyage improbable. It seems most probable that introduction of viable spores was by air transport of maize, either for use as a vegetable 'on the cob', or for experimental purposes as seed samples.

Most of the information in the 3rd paper has already been noticed [loc. cit.]. It is postulated that the success of the uredostage resulted in the suppression of the sexual phase of the life-cycle.

Dietrich (S.). **Untersuchungen zur Biologie und Bekämpfung von Ustilago zeae (Beckm.) Unger.** [On the biology and control of *U. maydis*.]—*Phytopath. Z.*, **35**, 3, pp. 301–332, 6 graphs, 1959. [English summary. 37 ref.]

In studies at the Institut für Pflanzenschutz der landwirtschaftlichen Hochschule, Stuttgart-Hohenheim, Germany, the germination of *U. maydis* spores in the soil was secured under certain conditions but to a limited extent only. Except in individual instances infection of maize arises from soil spores. The infection hyphae are able to develop into a normal promycelium under laboratory conditions. Experiments indicated that 1st infection in the spring may occur at the 1st leaf stage and certainly by the 2nd. Infection is favoured in the rolled leaves filled with water, especially at low temp. The probability of the fungus attacking seedlings underground is negligible. The possibility of a single infection occurring at the rolled leaf stage, followed by the appearance of smut throughout the remaining growth of the plant, must certainly be accepted where natural infection occurs in the field.

Collections of *U. maydis* samples from different parts of Germany showed differences in pathogenicity. Several maize vars. differed in their susceptibility: those that are more susceptible in the field also showed less resistance to inoculation as 3-week-old plants.

In spore germination tests the most toxic were formaldehyde, copper oxychloride + rhodane-dinitrobenzene, pentachloronitrobenzene, and thiocarbamate. Both pure calcium cyanamide and that contained in the fertilizer also prevented germination, but Ca hydroxide had the opposite effect.

The germinability and pathogenicity of spores was diminished when mixed with soil treated with Ca cyanamide or Ca cyanamide FK 86 and FK 86 A (both containing mercury) at 5 dz./ha. Field soil-treatment experiments in 1953–4 gave a 54% decrease of smut with FK 86, and 66% with FK 86 A, both at 35 US cwt./2·5 acre. Normal Ca cyanamide gave no significant decrease. Cyanamide had no systemic action on chlamydospores injected into maize plants.

Broyles (J. W.). **Incidence of brown-spot of Corn in Mississippi in 1957 and estimations of its effect on yield.**—*Plant Dis. Reptr*, **43**, 1, pp. 18–21, 1 fig., 1959.

At Mississippi Agricultural Experiment Station, State College, up to 67% loss of grain and 100% lodging were obtained by artificial infestation of plots of the susceptible single cross maize NC7 × C.I. 21 with *Physoderma maydis* [**35**, p. 763]. Under natural epiphytotic conditions losses in the field ranged up to 25%. A 250-field sample examined over the State in 1957 had an estimated reduction of 1·9%.

Koble (A. F.), Peterson (G. A.), & Timian (R. G.). **A method of evaluating the reaction of Barley seedlings to infection with Septoria passerinii Sacc.**—*Plant Dis. Reptr*, **43**, 1, pp. 14–17, 1959.

At N. Dakota Agricultural Experiment Station, Fargo, barley seedlings at the 3-leaf stage in the greenhouse were sprayed with a spore suspension of *S. passorinii* [**38**, p. 254] containing 0·5% gelatin and a little tween 80. The disease developed best on the susceptible var. C.I. 10002 incubated at high humidity for 5 days at 21° C. These seedlings reacted with severe symptoms to 3- and 6-day-old cultures of 4 isolates (I, R, J, and D) and to 12-day-old cultures at I and R, but with only slight symptoms to 12-day-old J and D and to 24-day-old cultures of all four, whereas C.I. 4439 gave a resistant-type reaction. The best differentiation in reaction type between resistant and susceptible vars. was observed 16 days following inoculation.

Hampton (R. O.) & Buchholtz (W. F.). **Seasonal occurrence of Pythium graminicolum on roots of field-grown Corn.**—*Iowa St. Coll. J. Sci.*, **33**, 4, pp. 489–495, 3 graphs, 1959.

In the summer of 1956 root samples were taken at regular intervals from an early and a late maize var. (planted out on 5 dates from 8 Mar. to 6 June) and cultured on non-nutrient agar with added coumarin to promote the sporulation of *P. graminicola* and limit the growth of contaminants. The fungus [**38**, p. 403] was not cultured from the roots less than 14 or more than 132 days after planting; it was obtained predominantly from young, nearly white roots. Its frequency of occurrence was high in early June (37·5%) and early Sept. (15·8%), but it was absent from cultures taken in late July and early Aug.: after 7 June variations in the frequency of occurrence were associated positively with variations in precipitation, and negatively with variations in av. daily soil temp. max. The frequency of *Fusarium* spp. was: on 22 May, 75%; 30 May, 66·6%; 2 Aug., 57·5%; 22 Sept., 55%. *Fusarium* spp. (particularly *F. graminearum*, *F. graminum* and *F. moniliforme* [*Gibberella fujikuroi*]) were predominant fungi in cultures from crown and lower stalk internode tissues in Sept. and Oct., while *P. graminicola* was found only 3 times in such cultures.

The frequency of these fungi in root cultures is not necessarily a measure of their destructiveness, but rather of their destructive potential, and *P. graminicola* may be said to have reached its max. destructive potential on 7 June on 33-day-old plants. Although apparent entrance of *F.* spp. into the lower stalk nodes via the leaf sheath was registered in Aug. when the rainfall was heavy, entry via the roots was suggested by the somewhat greater frequency of *F.* spp. in cultures from the lower than the upper crown on 5 Sept. and 22 Sept.

Rhoades (H. L.) & Linford (M. B.). **Control of Pythium root rot by the nematode Aphelenchus avenae.**—*Plant Dis. Reptr*, **43**, 3, pp. 323–328, 2 fig., 1959.

At the University of Illinois, Urbana, when 125,000 *A. avenae* were added per 6 in. pot of autoclaved soil, maize seedlings remained unaffected, and they developed only mild root rot with nematodes+*P. arrhenomanes* [**37**, p. 718]; root rot was severe when the fungus was added alone, or with *Pyrenochaeta* sp. (on which the nematodes had been cultured). In the laboratory the nematode fed destructively on the *Pythium* and in the greenhouse it invaded *Pythium* lesions in maize roots, but not healthy roots. These observations indicate that *A. avenae* is not a root parasite but a beneficial mycophagous nematode.

Sadasivan (T. S.). **The problem of the blast disease of Rice.**—*Proc. Indian Acad. Sci.*, Sec. B, **49**, 1, pp. 1–6, 1959. [15 ref.]

In a lecture on rice blast (*Piricularia oryzae*) delivered 29 Dec. 1958 at the 24th Annual Session of the Indian Academy of Science, Baroda, the subject was reviewed in the light of references, most of which have been noticed [cf. **38**, p. 244 *et passim*]. [The lecture is also summarized in *Curr. Sci.*, **28**, 1, pp. 10–11, 1959.]

Rangaswami (G.) & Subramanian (T. V.). **The correlation between the leaf and neck infections of the blast disease of Rice.**—*Indian Phytopath.*, **11**, 2, pp. 179–185, 2 graphs, 1958.

Information supplied by the Agricultural Research Institute, Coimbatore, India, on the incidence of *Piricularia oryzae* [see above] on 10 rice vars. collected from 1943–4 to 1952–3, was analysed to determine possible correlation between leaf and neck infections caused by the fungus. A positive correlation was found only for the more susceptible vars.: Adt. 10, Co. 13, Co. 7, Co. 18, Bam. 2, and GEB 24. Although a given var. seemed to be equally susceptible at both sites over the

period in a given yr. heavy incidence of leaf infection was not always associated with a proportionately high neck infection and vice versa.

Abeygunawardena (D. V. W.) & Peiris (J. W. L.). **Studies on the fungicidal control of Rice blast. I. The fungistatic efficacy of certain organic and inorganic fungicides on Piricularia oryzae.**—*Indian Phytopath.*, **11**, 2, pp. 116–121, 2 graphs, 1958.

Of 16 fungicides tested by a spore germination technique [cf. **17**, p. 405] at the Dept of Agric., Peradeniya, Ceylon, all copper oxychloride formulations were ineffective against *P. oryzae* [cf. **37**, p. 210], whereas cuprous oxides and 3 formulations of Bordeaux mixture proved fungistatic. Organic fungicides were superior to the inorganic, fermate with an ED_{50} value of 0·0016 being by far the most effective.

Hashioka (Y.) & Ikegami (H.). **Phytopharmacological studies on the Rice diseases, V. Fungicidal action of the organomercurials and organosulfurs evaluated by morphological alteration of conidia of the Rice blast fungus.**—*Res. Bull. Fac. Agric. Gifu Univ.* 9, pp. 41–48, 6 fig., 4 graphs, 1958. [Japanese summary.]

In further studies in this series [cf. **36**, p. 495] the percentage of spores of *Piricularia oryzae* coagulated by organomercurial solutions fell rapidly at concs. below 10^{-6} Hg. g./l., excepting phenyl mercury-paratoluene sulphonanilide (PMTS), which was fungitoxic even at 10^{-9}. The critical conc. of the organomercurials for germination inhibition was 10^{-6}–10^{-7}, and roughly coincided with that for *Cochliobolus miyabeanus* (5×10^{-7}). They produced severe coagulation and possessed a strict range of phytotoxicity, especially phenyl mercury acetate (PMA).

Thiram, ziram, and ferbam [cf. above] had a wider range (10^{-6}–10^{-9}), the critical conc. for germination inhibition lying between 10^{-5} and 10^{-7} (for methylarsine bisdimethyl dithiocarbamate it was 10^{-5}–10^{-6}). The differing efficacies of the 2 groups *in vitro* were endorsed in the field. The vacuolation and coagulation of conidia in low concs. of the above fungicides, the repression of germination after a few minutes' contact with dilute solutions (e.g. 10^{-6} of organomercurials), and an increase in the percentage of coagulated spores after suspension in the same solutions for 10 min. suggest that the toxicants are absorbed by the spores very quickly [cf. **37**, p. 334].

Ikegami (H.). **Studies on the false smut of Rice. II. The action of the different fungicides to germination of chlamydospores and ascospores.**—*Res. Bull. Fac. Agric. Gifu Univ.* 9, pp. 49–54, 6 fig., 4 graphs, 1958. [Japanese. Abs. from English summary.]

Chlamydospores ('yellow ball' stage) and ascospores of *Ustilaginoidea virens* [cf. **31**, p. 455] were immersed for 24 hr. in Cu fungicides, cupro-mercurials, and mercurials at concs. 10^{-4}–10^{-9} Hg or Cu g./l., at 28° C. The numbers of conidia produced by chlamydospores and of spherical bodies at the tips of ascospores after treatment were counted. Mercurials proved the most effective, causing 100% inhibition of chlamydospore germination at 10^{-6}–5×10^{-7}, and of ascospores at 10^{-5}–10^{-6}. For cupro-mercurials the concs. were 10^{-5} and 5×10^{-5}, and for Cu fungicides 10^{-4}–10^{-5} and 5×10^{-5}. Inhibition of chlamydospore sporulation required a lower conc. of Hg than inhibition of germination, but in Cu solutions both occurred at the same conc. In a conc. which produced 50% inhibition chlamydospores only bore 1 conidium even if they could germinate, irrespective of the fungicide employed.

Makino (M.) & Hashioka (Y.). **Germinability and drug tolerance of conidia of the Rice leaf-scald fungus (Rhynchosporium oryzae Hashioka et Yokogi).**—*Sci.*

Rep. Fac. Agric. Meijo Univ. 3, pp. 17–21, 1 pl., 3 graphs, 1959. [Japanese. Abs. from English summary.]

Further investigation of *R. oryzae* [**34**, p. 482] indicated the opt. temp. for hyphal growth and conidial germination to be 24° C. and the range 14–31°. Plasmolysis of conidial protoplasm took place in 0·9 M cane sugar solution and in 0·25–0·5 M KNO_3. In organomercurials (methoxyethyl mercuric chloride, ethyl mercuric phosphate, and phenyl mercuric acetate) at dilutions of 10^{-4}–10^{-5} (100–10 p.p.m., compound basis) the protoplasm coagulated, resembling plasmolysed cytoplasm; 10 min. in 10^{-6} solution prohibited germination; in thiram and ziram at 10^{-4}–10^{-6} protoplasm of most conidia coagulated in granular fractions following severe vacuolation.

Johnston (A.). **Fungicidal treatment of padi seed.**—*Malay agric. J.*, **41**, 4, pp. 282–289, 1958.

In further investigations [cf. **34**, p. 251] samples of rice seed from 5 localities in Johore, Province Wellesley, and Selangor were examined. *Helminthosporium oryzae* [*Cochliobolus miyabeanus*], the commonest fungus present (affecting 9·1% of the seed), was more common on surface sterilized seed and was the most damaging to young seedlings. *Trichoconis padwickii* was isolated from 7·9% of the grain and *Fusarium* spp. from 14·6%, these fungi being more frequent on unsterilized seed. *Aspergillus niger*, *A. tamarii*, and *Penicillium vermiculatum* occurred only as surface contaminants. In inoculation tests *C. miyabeanus* attacked 96% of the seedlings, killing 82%; comparable figures for *Fusicladina* sp. were 52 and 32, *Curvularia* sp. 43 and 20, and *T. padwickii* 19 and 14.

Of the seed dressings tested tillex and agrosan GN dusts were the most consistently effective, being easier to apply evenly than a wet mercurial. In view of the toxicity of mercurial dressings the seed should be soaked beforehand to prevent accidental use for consumption. Laboratory and field experiments showed that whereas treatment of fresh seed of high percentage germination was not beneficial, improved germination was obtained by dressing older seed of reduced viability.

Webster (O. J.) & Leukel (R. W.). **Sorghum seed-treatment tests in 1958.**—*Plant Dis. Reptr*, **43**, 3, pp. 348–349, 1959.

In 1958 field tests were conducted in 2 localities to test the relative effects of several fungicides on germination, field stands, and control of covered kernel smut (*Sphacelotheca sorghi*) [**38**, p. 205] on glume-free sorghum seed. At the U.S. Dept Agric., Beltsville, soil conditions being very favourable for the smut, infection on Combine-60 kafir averaged 54·4%. Phygon, spergon, and 5 mercurials eliminated smut infection completely. The other treatments, with 1 exception, reduced infection to less than 3%. At the Nebraska Agricultural Experiment Station, Lincoln, however, where soil conditions were not conducive to smut, from untreated seeds only an av. of 3·7% developed; 12 compounds eliminated smut, and for the remainder it was 0·1% or less. None of the fungicides reduced emergence; several seemed to improve it. With Rancher sorgo at Beltsville, where the controls averaged 37%, smut was eliminated by phygon, spergon, and 7 mercurials; infection was reduced to 6% by 3 non-mercurials. At Lincoln the controls averaged 7·4% and for the mercurials and 7 of the non-mercurials it was nil.

Maslovskiĭ (A. D.). Об устойчивости Проса к головне. [Concerning resistance of Millet to smut.]—*Agrobiology, Moscow, 1959*, 2 (116), pp. 203–207, 1959.

Some of this information from the Botanical Garden, Khar'kov State University has been reported [**37**, p. 535]. Using several millet [*Panicum miliaceum*] vars. 5 strains of *Sphacelotheca panici-miliacei* [*S. destruens*] were distinguished. The Timiryazev strain [**38**, p. 205] was highly pathogenic to the Khar'kov MM vars.

whereas that from Barnaul and Kiev was less so but more pathogenic to the old local selections. The Mirgorod and Sinel'nikov strains failed to infect VNIS 29 but were pathogenic to Khar'kov MM, and the Khar'kov strain was highly pathogenic only to the local selections. The most resistant of the Khar'kov MM vars. were M-3, M-4, and M-5.

Reichert (I.). **Virus diseases of Citrus in Israel and neighbouring countries.**—Reprinted from Le Livre du IVe Congrès internationale de l'Agrumiculture méditerranéenne, Tel Aviv [1956], 7 pp., 6 fig., [? 1959. 39 ref.]

Part of this conference has been noticed [**36**, pp. 23, 26]. The most prevalent foreign virus disease of citrus in Israel is psorosis A [cf. **37**, p. 476]; psorosis B, which may be accompanied by circular spots on the leaves as well as by bark scaling, is seldom found. Valencia orange and grapefruit are very susceptible to psorosis A, but Shamouti orange is affected only in single instances. It is an advantage to discover psorosis A during the initial stage of the disease, which begins with the appearance of small pimples or flakes on the outer bark. Later, the condition develops into a bark scaling which may cover the whole tree. Treatment with 1% solution of dinitro-*o*-cyclo-hexylphenol [DN-75] is recommended (Yearbook of Agriculture, 1953 [**33**, p. 438], pp. 738–743).

Xyloporosis [**38**, p. 258] is usually associated with sweet lime and rough lemon stocks, and in a milder form it appears on sour orange. In Mikve Israel the use of sweet lime rootstock induced the disease in 50 vars. of sweet orange from all parts of the world. Shamouti sweet orange is also a carrier [cf. **33**, p. 347]. Heavy soils and high levels of irrigation favour the disease. Evidence obtained in Israel supports the view that xyloporosis and tristeza are distinct diseases [cf. **36**, p. 317]. The paper concludes with suggestions for combating the menace of tristeza for the whole Mediterranean area and the threat of xyloporosis in areas probably still free from the disease.

Nagpal (R. L.). **The causes of 'dieback' diseases of Sweet Orange (Mosambi) in Bombay State and possible methods of their control.**—*Sci. & Cult.*, **24**, 10, pp. 478–481, 4 fig., 1959.

Thousands of Citrus trees in Bombay State have either died or are in various stages of decline [cf. **32**, p. 473; **37**, p. 535] caused by factors other than soil conditions, fungi, or insects. The trees are deficient in Zn, Mn, and Mg, and contain an excessive conc. of Fe, K, and P, but repeated soil applications and sprayings have failed to correct the condition. Further work confirmed the presence of [citrus] xyloporosis, psorosis, and tristeza viruses [**38**, p. 477], trees infected by tristeza exhibiting progressive depletion of carbohydrates and a pronounced phloem necrosis in the stock near the bud union. Inoculation to acid lime and sour orange rootstocks confirmed the presence of tristeza virus; by the same method it was demonstrated in young, symptomless trees, suggesting that the virus is very widespread. In 1955 nucellar seedlings were raised in order to produce material free from virus diseases: the rough lemon strains from Andhra and Assam budded with nucellar and existing scions produced more vigorous plants than the local rough lemons.

Calavan (E. C.), Soost (R. K.), & Cameron (J. W.). **Exocortis-like symptoms on unbudded seedlings and rootstocks of Poncirus trifoliata with seedling-line tops, and probable spread of exocortis in a nursery.**—*Plant Dis. Reptr*, **43**, 3, pp. 374–379, 7 fig., 1959.

At the University of California Citrus Experiment Station, Riverside, bark symptoms resembling but not typical of those of exocortis [**38**, p. 3] were recently discovered in many presumably uninoculated trees, both seedlings and rootstocks, of trifoliate orange (*Poncirus trifoliata*) [**37**, p. 283]. Cracking of the bark was noted in Oct. 1958 on 2 14-yr.-old seedling progeny from a diploid *P. trifoliata*

seedling. Excavation of the lower trunk of the 25-yr.-old parent tree showed the same pattern of cracking, extending in depth from 1–3 mm. and 1–15 cm. in length. The cracks were mostly longitudinal, at intervals varying from 1–5 cm., and the bark between them was dead, usually to a depth of 1–2 mm. below the surface. In addition to this tree a tetraploid trifoliate orange, probably from the same parent, had been used in 1944 as a source of seedling rootstocks for scions of 15 vars. In 1958 these trees were examined and 46 of 57 diploid rootstocks were found to have underground cracks, 5 of the 46 having considerably more exfoliation of bark than the remainder, which was believed to be due to exocortis infection. It is considered that genetic factors are most probably responsible for the bark cracks in the diploid trifoliate orange but that development of exocortis in the other rootstocks was caused by infection contracted in the nursery, either through root grafts or by a vector moving in the direction of the water flow, which tallied with the spread of the disease.

Khan (A. H.). **Some new diseases of Citrus in Pakistan.**—*Mycopathologia*, **10**, 4, pp. 289–302, 9 fig., 1959. [27 ref.]

These diseases were studied at the Pakistan Forest Research Institute, Abbottabad. In one orchard old sweet orange trees were affected by a general decline and die-back. In the 3rd yr. fruit bodies of *Ganoderma lucidum* appeared, and when the roots were exposed a white mycelium was found under the bark and hyphae were spreading on the root surface. Other trees nearby displaying similar symptoms also had a fungal infection of the roots [cf. **24**, p. 411]. *Fuscoporia laevigata* was reported to attack the trunk of *Citrus reticulata* in Lahore.

In Lyallpur scaly bark and canker disease is common, especially on sweet orange, and is most severe on *C. reticulata* var. *mandarin*. The bark is dark and has a glazed appearance. There is an ooze which dries up and leaves a 'water-mark' on the sides of the dead portion. The disease spreads longitudinally in strips, the subtending roots below a strip become affected and die, and branches also are killed. In late stages the bark peels off in rectangular scales, exposing cankers. Affected branches bear heavily and then start to die. Wood in active stages of infection has an orange-coloured advancing zone and farther inside there is a dark grey stain. Sometimes dark and light zones alternate along the rings. *Hendersonula toruloidea* [cf. **13**, p. 382; **35**, p. 647] was constantly associated with the disease on both orange and mandarin, often together with *Diplodia natalensis*. The primary pathogen is probably *H. toruloidea* and fluctuations in water supply may be predisposing factors. The line of rain water flow along a limb is generally followed by the fungus.

Sweet orange and lime, flood-irrigated from the same channel, were affected by a root rot. In summer, a few days after irrigation, mycelial fans emerged from the base of a tree which in other respects appeared to be healthy, though the leaves were flagging slightly. On another tree thinning of the foliage was noted and fruit bodies of *Poria ambigua* [cf. **16**, p. 6] were present at the base. Most of the roots of affected trees were rotten and the trees died in patches.

Eckert (J. W.) & Kolbezen (M. J.). **Fruit decay control program at the Citrus Experiment Station.**—*Calif. Citrogr.*, **44**, 4, pp. 110, 120–122, 1 fig., 1959.

Of the 400 chemicals screened in 1958 against various citrus fruit decay organisms at the University of California Citrus Experiment Station, only 2—isopropylamine and sodium dichloro*iso*cyanate—showed promise for large-scale evaluation. The latter is particularly effective with lemons, for which ammonia treatment [**38**, p. 144] is sometimes seriously inadequate.

Portères (R.). **Valeur agronomique des Caféiers des types Kouilou et Robusta cultivés en Côte d'Ivoire.** [The agronomic value of Coffee of the Kouilou and

Robusta types grown in the Ivory Coast.]—*Café, Cacao, Thé*, **3**, 1, pp. 3–13, 2 maps, 1959.

Of the *Coffea canephora* types the most resistant to tracheomycosis [*Gibberella xylarioides*: cf. **36**, p. 382] are the Robusta vars. Ebobo and INEAC, followed (in descending order of resistance) by Lulla, and Congo Belge, and then by the Kouilou vars. Madagascar, Niaouli, Petit Indénié, Bandama, and Touba. To *Hemileia* [*vastatrix*: cf. **35**, p. 606] Ebobo is the most resistant, followed (in descending order) by Java, Congo Belge, and INEAC, and then by the Kouilou vars. Madagascar, Petit Indénié and Niaouli, Bandama, and Touba; after these come the Arabica coffees.

Valdez (R. B.), Pordesimo (A. N.), & Orillo (F. T.). **A field evaluation of six stickers in combination with parzate for the control of Coffee rust.**—*Plant Dis. Reptr*, **43**, 5, pp. 562–564, 1959.

In these trials at Laguna, Philippines, 5 commercial stickers were applied with parzate against *Hemileia vastatrix* on 3-yr.-old Arabian coffee, 4 at 3 pints/100 gal. (lower rates recommended by manufacturers being found unsatisfactory) and para rubber latex, which sometimes tended to clog nozzles, at 1½ pints; 6 sprays were applied over 12 weeks. Goodrite p.e.p.s. (50% polyethylene polysulphide) gave the best result (9·4% rusted leaves compared with 89·81 for the unsprayed), but differences between treatments with and without stickers were not statistically significant. Partial protection by coconut trees from direct torrential rain did not allow the full value of the stickers to be tested.

Nag Raj (T. R.) & George (K. V.). **'Target leaf spot' disease of Coffee. I. Occurrence, symptoms and etiology.**—*Indian Phytopath.*, **11**, 2, pp. 153–158, 7 fig., 1958.

At the Coffee Research Station, Balehonnur, Mysore State, a new leaf spot disease of *Coffea arabica* was noticed in a few local plantations and in Sakleshpur. It was found mostly on young seedlings, but sometimes also on mature bushes, though rarely attacking the tender stems or fruits. The spots, enlarging to 20–25 mm. in 4–5 days, were characteristically zoned on the upper surface, bearing on the lower surface superficial black sporodochia with white ciliate margins. Severe infection causes affected leaves to be shed. Preliminary pathogenicity trials showed the fungus (*Myrothecium advena*) to be an active parasite on *Coffea arabica*, apparently being the 1st record of this. The disease has not acquired a major status in S. India so far. Further work is in progress.

Bastos Cruz (B. P.). **A fusariose do Algodoeiro.** [Fusariosis of Cotton.]—*Biológico*, **25**, 2, pp. 45–47, 1 fig., 1959.

In connexion with a severe outbreak of infection by *Fusarium* [*oxysporum* f.] *vasinfectum* in Nov.–Dec. 1958 information is presented on the history and distribution of the wilt in Brazil [**16**, p. 607], with special reference to São Paulo State. The 1st symptoms on 16-day-old plants of var. Campinas I.A. 817 inoculated with cultures from 5 localities developed after 2 weeks and death ensued within a few days.

Verticillium alboatrum has also been frequently encountered in São Paulo, but its importance in comparison with *F. o.* f. *vasinfectum* is negligible.

Halisky (P. M.), Garber (R. H.), & Schnathorst (W. C.). **Influence of soil temperature on Verticillium hadromycosis of Cotton in California.**—*Plant Dis. Reptr*, **43**, 5, pp. 584–587, 1 fig., 1959.

A more detailed presentation from the University of California, Davis, of data on *V. alboatrum* already noticed [**38**, p. 5].

In (S.-Y.). Изучение вертициллиозного и фузариозного увядания. [Study of the verticilliosis and fusariosis wilting.]—Мат. Об. науч. Сесс. Хлопк., Ташкент [*Mat. Ob. nauch. Sess. Khlopk., Tashkent*], **2**, pp. 230–240, 1958. [Abs. in *Referat. Zh. Biol., 1958*, 23, p. 198, 1958.]

A detailed report from China presents the conditions for infection by, means of spread and control of, and selection of cotton vars. resistant to *Verticillium albo-atrum* and *Fusarium* [*oxysporum* f.] *vasinfectum* [cf. **37**, p. 663]. The spread of the former depends on temp., e.g. at 25° [C.] incidence was high, at 28° less, and at 30° absent. The disease is seed- and air-borne. *F. o.* f. *vasinfectum* is prevalent, especially in acid soils. The main control measure is the use of actinomycete fertilizer (description given). The lines most resistant to *V. alboatrum* are the hybrids between *Gossypium barbadense* and *G. hirsutum*.

Gubanov (G. Y.). Физиологические основы устойчивости Хлопчатника к заболеванию вертициллиозом. [The physiological basis for resistance in Cotton to verticilliosis.]—Мат. Об. науч. Сесс. Хлопк., Ташкент [*Mat. Ob. nauch. Sess. Khlopk., Tashkent*], **2**, pp. 304–313, 1958. [Abs. in *Referat. Zh. Biol., 1958*, 23, p. 198, 1958.]

The author suggests that the excessive amount of phenol accumulated in cotton plants infected by *Verticillium* wilt [*V.* ? *alboatrum*: cf. above] causes the wilting. In the diseased plant amylase activity is sharply increased, starch content of the stem and leaves decreased, and phenol and tannin increased. This is contrary to the established conception that phenols and tannin increase resistance [cf. **32**, p. 312; **34**, p. 298].

Askarova (Мме S. A.). О перспективе применения антибиотиков микробного происхождения в борьбе с гоммозом Хлопчатника. [On the prospect of using antibiotics of microbic origin for the control of Cotton gummosis.]—Мат. Об. науч. Сесс. Хлопк. Ташкент [*Mat. Ob. nauch. Sess. Khlopk., Tashkent*], **2**, pp. 326–331, 1958. [Abs. in *Referat. Zh. Biol., 1958*, 23, p. 198, 1958.]

The use of antibiotics from actinomycetes for treating cotton seeds against gummosis [*Xanthomonas malvacearum*: **38**, p. 84] was superior to wet treatment with formalin, and gave results equivalent to copper trichlorophenolate dry treatment. The antibiotic prevented the appearance of leaf, stem, and pod symptoms and sometimes completely eradicated the disease.

Safarov (S.) & Babaev (F.). Эффективность нового способа обработки семян Хлопчатника для борьбы с гоммозом. [Effectiveness of the new method for Cotton seed treatment against gummosis.]—Соц. С.-Х. Азерб. [*Sotsial. Sel.-Khoz. Azerb.*], *1958*, 3, pp. 44–47, 1958. [Azerbaijan and Russian. Abs. in *Referat. Zh. Biol., 1959*, 9, p. 212, 1959.]

The method proposed by the Azerbaijan Scientific Research Chemical Institute, U.S.S.R., for the disinfection of cotton seed against gummosis [*Xanthomonas malvacearum*: cf. above] consists in delinting the seed 3 times, screening, and treating with 20% copper trichlorophenolate. The OS-1 apparatus is used for screening; only the heavy, big seeds (50% of all seeds) are used for planting and proved void of infection. The subsequent chemical treatment prevented not only new infection but also [unspecified] root rot. When this method was applied yields increased from 2·2–7·1 centner/ha.

Bird (L. S.) & Joham (H. E.). **The influence of nitrogen source and carbohydrate change by debudding and girdling on bacterial blight resistance caused by the B_7 gene in Cotton.**—*Plant Dis. Reptr*, **43**, 1, pp. 86–89, 1 graph, 1959.

Upland cotton, strain E4–2–2–13, carrier of the B_7 gene, grown on Miller clay

loam soil in the Brazos Valley, Texas, was used in experiments on the factors affecting resistance to inoculation with races 1 and 2 of *Xanthomonas malvacearum* [**38**, p. 407]. Disbudded plants became less tolerant while those with the main stem girdled became resistant. In plots with 80 lb. N/acre tolerant plants became resistant. Nitrate N was more efficient than ammonium N in increasing resistance.

Kennedy (B. W.) & Brinkerhoff (L. A.). **Comparison of four soil fungicides in the greenhouse for the control of seedling diseases of Cotton.**—*Plant Dis. Reptr*, **43**, 1, pp. 90–97, 2 fig., 1959.

At Oklahoma Agricultural Experiment Station, Stillwater, 65% zineb, 75% pentachloronitrobenzene, 75% thiram, and 50% captan [**37**, p. 722], mixed as dusts with a steamed sandy loam 20 days after inoculation, all conferred fairly good protection on Deltapine 15 cotton seedlings against *Rhizoctonia* [*Corticium*] *solani* [**38**, p. 407]. Against *Pythium debaryanum* PCNB was not generally effective at rates as high as 1 part active chemical/5,000 parts soil. Captan was effective at 1:40,000 when temp. did not favour post-emergency injury. Thiram was reasonably effective against both fungi at 1:20,000 and zineb at 1:5,000. PCNB was reasonably effective against *C. solani* at 1:5,000, but at lower rates results were not conclusive. Zineb, captan, and PCNB retained their fungicidal effectiveness for 4–6 weeks in a non-steamed, moist sandy loam of pH 6.

None of the fungicides was effective against either pathogen when low temp. seriously retarded germination and growth of the host.

Ashour (W. E.). **Effect of seed and soil treatments on emergence and yield of Cotton.**—*Ann. agric. Sci., Cairo*, **2**, 2, pp. 69–82, 1957. [Arabic summary.]

At Ain Shams University seed dressings with 1% fernasan in 1952–54 [**37**, p. 722] increased the percentage survival of Giza 30 cotton after 50 days, especially with a heavy sowing rate (14 seeds/hole, 30 holes/m. row), over no treatment or formalin dust (15:85 parts commercial formalin: sawdust) below the seed. Damping-off was higher in the heavy than in ordinary sowings (7 seeds/hole, 20 holes/row) which also gave a higher yield. Formalin dust increased post-emergence damping off, fernasan did not definitely decrease percentage infection, nor did seed treatment increase the percentage of final survivals in Sept. Seed and soil treatments produced no definite increase in av. yield/plant, which in 1952 was higher in the controls than in the treated, probably because the latter produced more plants.

Wiles (A. B.). **Calcium deficiency in Cotton seedlings.**—*Plant Dis. Reptr*, **43**, 3, pp. 365–367, 1 fig., 1959.

Tests at Mississippi Agricultural Experiment Station and State College showed that adequate control of Ca deficiency (J. T. Presley & O. A. Leonard, *Plant Physiol.*, **23**, p. 516, 1948), which produces symptoms of root browning and rotting closely resembling those attributed to 'nub root' [**37**, p. 45] and soil-borne fungi, was obtained when fuzzy or machine-delinted cotton seed was rolled in dry calcium sulphate before planting [cf. **37**, p. 722]. Seedlings thus grown were more vigorous and emerged more rapidly.

Krzyształowska (Helena). **Wpływ zaprawiania nasion na plon Lnu.** [The effect of seed treatment on Flax yield.]—*Prace Inst. przem. Włókien Łykow.*, **5**, 2, pp. 1–10, 1957. [Russian, English, and French summaries. Abs. in *Referat. Zh. Biol., 1959*, 9, p. 213, 1959.]

In 4-yr. laboratory and field tests in Poland presowing treatment of flax seeds with the dry fungicides agrosan, nomersan, hermisan, thiram, fungitox OP, and fungitox T gave a marked decrease of infection by *Colletotrichum lini* [*C. linicola*: **35**, p. 526], *Polyspora lini* [**38**, p. 85], and *Fusarium* sp., a decrease of prematurely dying plants,

and an increase of fibre from 1–8·5 centner/ha. The most effective were agrosan at 0·15–0·4% and nomersan at 0·3–0·4%. For better adhesion the seeds were treated with paraffin and other oils.

Ali (M. I.), Ahmed (Q. A.), & Khundkar (M. H.). **Evaluation of fungicidal properties of lignin acetic acid. II. Studies on treated Jute seeds in infested soil.**

Khanum (R.) & Ahmed (Q. A.). **Studies on the distribution, growth, and cellulolytic activity of fungus organisms causing deterioration of raw and finished products. Effect of lignin acetic acid in the rot-proofing of Cotton yarns and Jute fibres.**—*Pakist. J. sci. industr. Res.*, **1**, 2, pp. 113–115; 4, pp. 251–257, 4 fig., 2 graphs; pp. 317–319, 2 graphs, 1958.

In further work at the University of Dacca, E. Pakistan [**38**, p. 350], seeds of the C. G. var. of jute (*Corchorus olitorius*) were surface-sterilized with lignin acetic acid, 1% in alcohol, a 5% aqueous suspension, or a dry powder (66% by wt. mixed intimately with the seeds), and then stored dry before sowing in sterilized soil inoculated with *Rhizoctonia* sp. or *Macrophomina phaseoli*. In sterilized uninoculated soil there was about 10% mortality of both treated and untreated seeds; with untreated seeds exposed to *Rhizoctonia* it was 64%, compared with 8–12% in the various treated samples. With *M. phaseoli* there was 42% mortality of untreated seed compared with 26% for the treated, a result not statistically significant.

The 2nd paper describes the isolation of fungi from various mildewed articles on Waksman's glucose peptone medium at 30° C. Among the 24 fungi listed, *Penicillium* (10 spp.) and *Aspergillus* (7 spp.) were the most frequently encountered. *Memnoniella echinata* was frequently found to be responsible for damage to cotton fabrics in humid tropical areas; *Trichoderma lignorum* [*T. viride*] and *Cunninghamella* sp. were isolated from jute sacking, *Paecilomyces* sp. from a camera lens, and *Fusarium conglutinans* and *Curvularia lunata* from glucose tablets. When spores of *M. echinata*, *Penicillium terlikowskii*, *P. funiculosum*, and *Chaetomium globosum* were exposed to graded humidities, the percentage germination rose with humidity: after 24 hr. at R.H. 100 it was 70–80% at R.H. 99·85, 26·31% and at 99·04, 20–25%. An increase from 98 to 100% R.H. produced a 2–4-fold increase in the length of the germ tubes. *M. echinata* reduced the strength of sterilized cotton threads (22 count), dusted with spores and kept in a moist chamber, to about $\frac{1}{5}$ (i.e. breaking strain 51 g.) in 6 weeks; *P. terlikowskii* and *A. niger* reduced it by a little over $\frac{1}{2}$ in the same time.

For uninoculated jute fibres in the same test the breaking strain after the 2nd week was 42·2 g. and after the 6th 37·5 g., the comparable figures for those inoculated with *C. globosum* spores being 22·7 and 7·6 g., and for *P. funiculosum* 34·7 and 15·1 g., respectively.

Cotton yarns and jute fibres were dipped in a solution of 2 g. of lignin acetic acid in 5 ml. ethanol diluted with 95 ml. water, autoclaved, inoculated with spores of *M. echinata* and *C. globosum* respectively, and placed in moist chambers for 6 weeks. The fungicide did not effectively protect cotton, the percentage loss in breaking strength in controls at intervals of 2 weeks being 63, 70, and 80, compared with 53, 65, and 70, respectively, for the treated. With jute there was appreciable protection: 45, 69, and 84% loss of strength in the controls, and 11, 26, and 52% in the treated. Higher concs. of the fungicide may prove even more effective.

Nelson (P. E.) & Dimock (A. W.). **The effect of greenhouse cooling systems on the development of plant diseases.**—*Bull. N.Y. St. Fl. Grs* 161, pp. 1, 4, 1959.

In the summer of 1957 at Cornell University, Ithaca, and the Ornamentals Laboratory, Farmingdale, it was ascertained that under the experimental conditions

tested symptom expression of the vascular wilts, such as the chrysanthemum and snapdragon [antirrhinum] wilt (*Verticillium alboatrum*) and the carnation wilts due to *Fusarium oxysporum* f. *dianthi* [*F. dianthi*] and *Pseudomonas caryophylli*, was not affected by the greenhouse cooling system used. Antirrhinum rust (*Puccinia antirrhini*) and carnation rust (*Uromyces caryophyllinus*) [*U. dianthi*] developed most rapidly and abundantly in the pad and fan house (air moved at 7·5 cu. ft./sq. ft. floor/min. through a saturated pad across the house) and caused least infection in the uncooled house. Secondary spread of the rusts occurred in the pad and fan house. Carnation plants inoculated with *Alternaria dianthi* were more severely affected under low-pressure mist than in either the pad and fan or the uncooled house. Geranium plants inoculated with *Xanthomonas pelargonii* were more severely injured under low-pressure mist than in the pad and fan or uncooled. Rose powdery mildew (*Sphaerotheca pannosa*) developed only very slightly in the mist house and varied greatly in the others with the position of the plants in the house.

Kulkarni (S. N.) & Merh (J. L.). **A new host of Oidiopsis taurica (Lév.) Salm.**—*Sci. & Cult.*, **24**, 11, p. 526, 1 fig., 1959.

This is the 1st record (from the Institute of Plant Industry, Indore) of *Oidiopsis* [*Leveillula*] *taurica* on *Calendula officinalis*.

North (C. P.), Wallace (A.), Ryan (G. F.), & Mueller (R. T.). **Amelioration of virus symptoms in Camellia with iron.**—*Virology*, **8**, 1, pp. 131–134, 5 fig., 1959.

At the University of California, Los Angeles, several spp. and vars. of camellia with visual symptoms and shown by graft-transmission tests to be virus-infected were grown in 3-gal. containers and given via the soil 1 g. of Fe, chelated with ethylenediamine di (orthohydroxy phenylacetate). The tests lasted for 2 yr.; 10 plants were treated, and all responded similarly. Old leaves with symptoms became much greener in a few months. Subsequent new growth resembled that of plants without virus symptoms, but when the Fe supply was depleted the new growth bore symptoms resembling those present on untreated diseased plants, the flowers of which were variegated red and white, whereas those on the treated plants were solid red.

Andreucci (E.). **Indagini su una grave alterazione del Garofano prodotta da Fusarium roseum (Lk.) Snyder et Hansen.** [Studies on a serious disease of Carnation caused by *F. roseum*.]—*Nuovo G. bot. ital.*, N.S., **65**, 1–2, pp. 163–195, 18 fig., 1958. [English summary. 83 ref.]

The results are presented of studies made during several years into a disease of carnations grown for summer production near Pescia, Italy [cf. **28**, p. 396]. *F. roseum* [cf. **37**, pp. 86, 634 *et passim*] causes a necrosis, usually confined to a short section of the stem. The plants are seldom killed, but there is a loss of some branches and a limited growth of the flower stems. Infection occurs mostly from Feb. to June and causes great injury to certain recently introduced cultivars, especially William Sim, Lucky Strike, and White Sim from Holland; others badly affected are Italian, including Elia rosa, Elia rosso, Romana, Remo, and Loni. The local Giovinezza, Vanna, and Anita are very resistant. Frambuse, though not severely affected, developed cracking and necrosis of the pith, all the internodes of the flower stems being affected.

Penetration of the plants occurred in the absence of wounds through the young buds, but was more severe through cracks formed at the base of the plants towards the end of winter.

The paper concludes with a brief discussion of possible control, including modified cultural methods, frequent fungicidal spraying in winter and spring, and the use of resistant vars. Good control was obtained on Elia by spraying from Nov.

1957–Apr. 1958 at intervals of 12–15 days with 1·5% Bordeaux mixture or 0·3% zineb.

Jackson (C. R.) & Woltz (S. S.). **Yellow strapleaf disease of Chrysanthemum.**—*Plant Dis. Reptr*, **43**, 1, pp. 98–101, 3 fig., 1959.

This disease, which has occurred sporadically in Florida for the last 5 yr., increased considerably during the summer and early autumn of 1958, affecting most large commercial plantings in the major pompon-growing areas. Symptoms generally appear after rooted cuttings have become established in beds, usually 26 days after planting. Young leaves separating from the axillary buds after removal of the terminal growing point fail to expand normally and develop incurved tips, later becoming less involuted, dull yellow or ivory, and frequently narrow, very elongated, and slightly brittle, with small lobes, serrations, or entire margins. The upper part of the stem is frequently thickened and the entire stem becomes abnormally hard and brittle. Diseased plants may remain stunted and yellow for 6–8 weeks. Leaves occasionally become necrotic at the tips and along the margins, and necrotic flecks may develop on the tips of axillary buds. Root development is normal and sometimes apparently increased. Flower heads produced by plants which have resumed growth are often small and distorted, with few expanded ray petals.

No consistent patterns of distribution of the disease are apparent within the flower beds. Plants in pots are not affected. The most commonly and severely affected vars. are Blue Chip and Iceberg; Jetfire shows considerable resistance. No relation between soil treatment and incidence has been found and the disease was not transmitted by grafting or in tip cuttings, but plants recover rapidly if potted, even if soil from the affected beds is used, though recovery is slower if the pots are placed on the beds.

Sill (W. H.) & Chiu (R.-J.). **Kentucky Blue-grass, Poa pratensis L., a new host of the Bromegrass mosaic virus in nature.**—*Plant Dis. Reptr*, **43**, 1, p. 85, 1959.

Comparative inoculations of several hosts established that brome mosaic virus [cf. **37**, p. 711] was responsible for chlorotic mottling and striping of *P. pratensis*, growing among clumps of virus-infected *Bromus inermis* in Morris county, Kansas, in 1957.

Smith (J. D.). **The effect of species and varieties of grasses on turf diseases.**—*J. Sports. Turf Res. Inst.*, **9** (*1958*), 34, pp. 462–466, 1959.

To aid in the selection of grasses for sports turf the author presents a table showing the resistance or susceptibility of a number of spp. and vars. of grass over a number of years at the Institute. Resistance to *Fusarium nivale* [*Calonectria nivalis*] is shown by *Festuca rubra* ssp. *rubra* vars. FR 10 and S. 59, *Poa trivialis* var. Cambridge, and *Lolium perenne* vars. S23, 'New Zealand certified mother', and Irish; to dollar spot (*Sclerotinia homoeocarpa*) by *Agrostis tenuis* var. New Zealand, *A. canina* var. Barenza arida, wild strains of *A. stolonifera*, *F.r.* ssp. *commutata* (New Zealand Chewings' fescue), *F. ovina* var. Pontefract, and *P. trivialis* var. Cambridge; *A. stolonifera compacta* var. Lancashire is very resistant; to *Ophiobolus* patch (*O. graminis* var. *avenae*) by *F. r.* ssp. *rubra* var. FR 10, N.Z. Chewings' fescue, *P. trivialis* var. Cambridge, wild *P. pratensis*, and *Cynosurus cristatus* var. New Zealand; to *Corticium fuciforme* by *Phleum nodosum* var. S 50: to damping-off caused by *Cladochytrium* sp. by *F.r.* ssp. *rubra* FR 10, Golfrood, Steinach, Nordeney, Med. green (Van Engelen), and Light green (Van Engelen), Chewings' fescue vars. New Zealand, Oregon, Fresh green (Van Engelen), and Light green (Van Engelen), *Poa pratensis* var. P 6, *Lolium perenne* vars. S 23, Pelo, B2, and sports and lawn type (Van Engelen), *Cynosurus cristatus* var. New Zealand, and *Phleum nodosum* var. S 50; to damping-off caused by *Fusarium culmorum* by *L. perenne* var. S 23 and

Phleum nodosum var. S 50; and to *Helminthosporium vagans* by wild *Poa annua* and commercial vars. and commercial *P. trivialis*.

Jackson (N.). **Seed dressing trial, 1958.**—*J. Sports Turf Res. Inst.*, **9** (*1958*), 34, pp. 455–458, 1 pl., 1959.

Two plots on which a previous trial [**37**, p. 591] had been run were dug over, fallowed, and sown, with the intention of discovering whether the *Fusarium culmorum* inoculum was still active and of determining the effect of seed dressings (0·5% seed wt. of fernasan, 0·5% and 0·25% orthocide) on establishment. Sowing was completed on 18 Sept. 1958, and seedling data were recorded on 28 Oct.

With S 23 perennial ryegrass (*Lolium perenne*) there was no significant difference between inoculated and uninoculated areas, and seed dressings conferred no benefit. Residual effects of the previous year's inoculation were apparent from the significantly lower establishment of S 50 Timothy (*Phleum nodosum*) and Chewings' fescue (*Festuca rubra* ssp. *commutata*), except under 0·5% orthocide. Chewings' fescue was slower to germinate than ryegrass, taking 12–14 days, and even the uninoculated rows benefited (apparently equally) from the seed dressings. On the inoculated 0·5% orthocide was significantly better than the other treatments. Of the 3 grasses S 50 Timothy showed the poorest establishment in both inoculated and uninoculated areas. Seed dressing was beneficial in all cases, orthocide, at either rate, being significantly better than fernasan.

Smith (J. D.). **The effect of lime application on the occurrence of Fusarium patch disease on a forced Poa annua turf.**—*J. Sports Turf Res. Inst.*, **9** (*1958*), 34, pp. 467–470, 1959.

Attacks of *Fusarium* patch disease (*F. nivale*) [*Calonectria nivalis*: **36**, pp. 595, 701] are frequently observed to follow the application of ground limestone or other alkaline materials to turf. At the Sports Turf Research Institute, Bingley, Yorks., ground lime was applied (2, 4, 8, or 16 oz./sq. yd.) on 10 Sept. 1957 to susceptible *Poa annua* turf forced by application of ammonium sulphate and showing a trace (0·5%) of infection. At intervals the pH of the turf surfaces was measured and the incidence of the disease noted. It was clear that liming greatly increased incidence, the largest area (71% affected) occurring where 16 oz. was applied; the effect persisted as long as the surface ½ in. of turf had a sufficiently high pH. The effect of the lowest application had worn off by the following autumn, 1–3·2% infection compared with 0·2–2% on the untreated, but that of the higher dosages was still to be seen in Dec. 1958 (4·5–57·5%).

Jackson (N.). **Ophiobolus patch disease fungicide trial, 1958.**—*J. Sports Turf Res. Inst.*, **9** (*1958*), 34, pp. 459–461, 1959.

This trial was conducted on the Institute's exhibition site at the show ground of the Yorkshire Agricultural Society, Harrogate, 1958. Turf paths of *Agrostis tenuis* had been laid under bad conditions, and top dressings of alkaline cyanamide compost had been applied at the end of Apr. and twice in May. Patch disease (*Ophiobolus graminis* var. *avenae*) occurred in late summer. Of the 8 fungicides tested only the organic mercurials gave any measure of control, PP liquid mercury 'plus' and verdasan being the most effective. The latter was superior when used at double the normal rate, i.e. at 2 oz./2 gal./40 sq. yd., 2 such applications sufficing to clear infected areas adjacent to the trial site. Calcareous top dressings are known to favour this disease in *Agrostis* [cf. **36**, p. 594].

Comes (I.). **Contribuții la cunoașterea genului Claviceps.** [Contribution to the knowledge of the genus *Claviceps*.]—*Anu. Lucrar. ști., 1957*, pp. 331–338, 1957. [Russian and French summaries. Received June 1959.]

These are results of investigations since 1954 on *C. purpurea*, *C. microcephala*, and

C. sesleriae collected in the Craiova region, Romania, where 34 spp. of grasses are parasitized (27 listed here); *Haynaldia villosa* is a new host record and 15 other host spp. are 1st records for Romania. *C. purpurea* was found on 22 hosts.

Roberts (D. A.), Ford (R. E.), Ward (C. H.), & Smith (D. T.). **Colletotrichum anthracnose of Alfalfa in New York.**—*Plant Dis. Reptr*, **43**, 3, p. 352, 1959.

An epiphytotic of *C. trifolii* [cf. **38**, p. 87] during the summer of 1958 in several lucerne fields near New Berlin, N.Y., in 1 of which (var. Du Puits) were 50% diseased plants, half with severe crown rot, is reported from Cornell University, Ithaca. *Fusarium* spp. commonly occurred in the stems of attacked plants. Such an outbreak so far north is unusual.

Ostazeski (S. A.). **A Curvularia leaf spot of Alyce Clover.**—*Plant Dis. Reptr*, **43**, 3, pp. 350–351, 1 fig., 1959.

In the summer of 1957 fields of *Alysicarpus vaginalis* near Dunellon, Florida, were examined by the U.S. Dept Agric. and Florida Agricultural Experiment Sta. to determine the cause of severe stunting and leaf spotting, the spots being somewhat irregular but mostly circular, 1–2 mm. diam., and some extensive marginal necrosis. The spots have a tan to light brown centre with a thin dark brown border, usually surrounded by a distinct, yellowish halo. Such symptoms had been attributed to K deficiency, but were shown to be caused by *Curvularia maculans* [cf. **36**, p. 21], which grew and sporulated well on both V-8 juice agar and enriched potato dextrose agar. Spores germinated on agar, but poorly in tap water, distilled water, or a 2% sucrose solution.

Hashioka (Y.) & Ikegami (H.). **The mode of fungicidal action of the organomercurials and the thirams to sclerotia of Sclerotinia trifoliorum.**—*Res. Bull. Fac. Agric. Gifu Univ.* 8, pp. 1–7, 1957. [Japanese summary. Received Apr. 1959.]

In further studies on the control of *S. trifoliorum* on milk vetch [*Astragalus sinicus:* cf. **36**, p. 472], the thirams were found to be fungistatic and the soluble organomercurials fungitoxic. Dressing of sclerotia with the thirams, e.g. pomarsol forte, initially inhibited germination, but after a lapse of days increased apothecia emergence, which was further hastened by washing away the fungicidal residue on the sclerotial surface. Sclerotia were killed promptly by soluble organomercurials (e.g. uspulun). The varying fungitoxicity of organomercurials is due to their differing solubility in water: their lower efficacy in the field than in the glasshouse is mainly due to dilution by water in the paddy fields or by rain.

Azad (R. N.) & Sehgal (O. P.). **Some virus diseases of temperate fruits.**—*Indian Phytopath.*, **11**, 2, pp. 159–164, 7 fig., 1958.

Virus diseases are responsible for heavy losses of temperate fruits in N. India. Since 1953 a systematic and intensive survey of fruit orchards has been undertaken in the important cultivation areas in the Simla Hills and Kulu Valley by the Simla Sub-station of the Indian Agricultural Research Institute.

Plum line pattern [**37**, p. 239], was successfully transmitted under controlled conditions by grafting to seedling peach and almond and to a common wild species (*Prunus puddum*), besides plum seedlings and plum vars. Formosa and Green. Its transmission was also indicated in Santarosa plum. The occurrence of this disease in plum has also been reported from Kalimpong.

Plum mosaic is widespread in different localities of the Simla Hills. The disease has so far been transmitted by grafting to seedling peach, *P. puddum*, Greengage, Becky Smith and Green plum vars., and to Satsuma plum.

Incidence of a mosaic complex on wild Himalayan raspberry (*Rubus ellipticus*), a severe disease characterized by yellow or light green mosaic, ring spot mottle,

and oak leaf pattern, is over 50% in most localities. Line pattern and complete chlorosis and dwarfing of leaves have also been observed occasionally. The complex has been transmitted by bottle graft to *R. ellipticus* and *R. macilentus*, and by *Cuscuta reflexa* to the former. Line-pattern has been separated by this means. Apple mosaic [loc. cit.] of 2 types, 1 causing yellowish flecking and mottling of leaves and the other a diffused ring spot mosaic mottle, has been seen in apple orchards; the 1st, mainly on a newly introduced var. Red Gold, resembles mild mosaic [**33**, p. 88] while the 2nd is widespread in some old plantations of Golden Delicious.

Some Black Heart sweet cherry trees in Kulu Valley are considerably reduced in vigour by a variegated mosaic which is being investigated.

Current research and investigation.—*Orchard N.Z.*, **32**, 3, pp. 76–77, 1959.

The Horticultural Division of the Plant Diseases Division and Fruit Research Station reports a decrease in 1957 of collar rot [*Phytophthora cactorum*; cf. **37**, p. 47] in Cox's Orange apple trees at Nelson and Blenheim, soil-treated with various concs. of copper oxychloride in 1956–7. Dual temp. storage (at 38° F. for about 6 weeks, thereafter at 32°) reduced scald [cf. **37**, p. 7] in oil-wrapped Granny Smith apples at Auckland to 9% compared with 100% when stored throughout at 32°. There was little difference between the 2 treatments in the amount of scald at the end of the storage period when the fruit was not wrapped. Fruit of the same var. picked in early May had developed negligible scald in store by 1 Aug. compared with 88% in fruit picked in mid-Apr. Where the fruit was stored to mid-Oct., wrapping reduced scald incidence in the late harvested fruit only.

Kara mandarin is noted as a high quality fruit but the tree is susceptible to verrucosis [*Elsinoe fawcettii*: **23**, p. 79]. Tangelo vars. Minneola and Tiniura appear to be very susceptible to citrus blast [*Pseudomonas syringae*] and wither tip (*Glomerella*). Symptoms of what may be the scaly bark form of psorosis have been observed this year on Yalaha tangelo trees in Kerikeri. This is the first evidence that this form of psorosis exists in New Zealand [cf. **37**, p. 283].

Parker (K. G.). **Verticillium hadromycosis of deciduous tree fruits.**—*Plant Dis. Reptr, Suppl.* 255, pp. 39–61, 1959. [143 ref.]

This review, presented from Cornell University, Ithaca, New York, covers all aspects of *Verticillium* wilt or hadromycosis (*V. alboatrum* and *V. dahliae*) as it affects tree fruits belonging to the genus *Prunus* and the subfamily Pomoideae of Rosaceae, and in general the literature subsequent to that included in Rudolph's monograph [**10**, p. 757]. An important feature in susceptibility appears to be the scion-stock combination. Good cultural conditions offer the best prospect of control.

Posnette (A. F.) & Cropley (R.). **The reduction in yield caused by Apple mosaic.** —*Rep. E. Malling Res. Sta., 1958*, pp. 89–90, 3 graphs, 1959.

Further results are given of a field trial in which apple trees of 4 vars. were graft-inoculated in their 23rd yr. with a mild or a virulent strain of apple mosaic virus [**35**, p. 615]. Yield of Cox's Orange and Allington Pippin was reduced by about 30% over a 4 yr. period, while that of Worcester Pearmain and Newton Wonder was only slightly reduced. Particular interest attaches to the effect of the mild strain, which produces inconspicuous or no symptoms in most apple vars., but which caused as much loss in Cox as the severe strain, though less in Allington.

Issa (E.). **O 'émosáico' da Maciera.** [Mosaic of Apple.]—*Biológico*, **25**, 4, pp. 80–85, 1 fig., 1959.

Apple trees imported into São Paulo from Argentina were found to be infected

by scab [*Venturia inaequalis*], mildew [*Podosphaera leucotricha*], and mosaic virus [**35**, p. 773], of which the last-named has not hitherto been recorded in Brazil. Transmission of infection occurred in only 30–36% of the grafts, indicating that the virus is not completely systemic. Of the 2 types of symptoms developing, vein-banding and vein-clearing, the latter was the more serious and might well cause a drop in production. Control should be based on the use of healthy material for grafting and the eradication and burning of diseased plants.

Chiu (W.-F.), Wang (C.-K.), & Wu (S.-T.). **Chemical test for the rough skin virus of Apple tree.**—*K'o Hsueh T'ung Pao, 1958*, pp. 278–279, 1958. [Abs. in *Chem. Abstr.*, **53**, 10, col. 9394 f, 1959.]

Full directions are given for the application of a test, based on the higher arginine content of infected foliage, which involves centrifugation at 18,000 r.p.m. for 15 min. of a filtrate of leaves frozen at −40° C. and the treatment of 5 ml. of the supernatant with 10% NaOH, 1 ml. 0·02% naphthol solution, maintenance at 4° for 3 min., and addition of 1 ml. NaOBr solution (2 g. Br/100 ml. 5% NaOH), with thorough shaking between the various steps. A purple-red, clear solution indicates virus infection, while an orange, turbid one is produced by healthy material.

Moore (M. H.) & Bennett (Margery). **The influence of early spring sprays on the incidence of Apple mildew.**—*Rep. E. Malling Res. Sta., 1958*, pp. 103–105, 1959.

An emulsion concentrate of DNOC with petroleum oil, diluted (at 3%) to give a spray containing 2·9% of winter-grade oil and 0·1% DNOC, applied at bud-swell or bud-burst to the same plots of M. III apple rootstocks over a 5 yr. period, significantly reduced the number of buds which grew out with overwintered mildew (*Podosphaera leucotricha*) within a few weeks of spraying. A similar spray of 2½% lime-sulphur reduced infection only in the final yr., and the reduction was of a much lower order. In this experiment standard summer applications of S were not given, so that the disease steadily increased on the foliage every season after spraying. In 1955, the only year in which scab (*Venturia inaequalis*) was appreciable, the single green-cluster application of lime-sulphur gave slight control, but the bud-burst sprays were ineffective.

Hey (G. L.). **Fighting the Apple mildew build-up.**—*Grower*, **51**, 12, pp. 621, 623, 625, 2 fig., 1959.

Recommended methods for the control of mildew [*Podosphaera leucotricha*: cf. **37**, pp. 666, 725 *et passim*] include addition of humus and the usual phytosanitary measures. Under adverse weather conditions high vol. applications of karathane, 1 lb./100 gal.+wetter, should start at pink bud with 5 subsequent applications at 2-week intervals; for low vol., 1¼ lb./acre weekly. For milder infections and trees tolerant of S, wettable S at 4 lb./100 gal., high vol., at 10–14-day intervals to July, or low vol. at 8–10 lb. is effective; wetting agents are not added to S sprays. For combined treatment of scab [*Venturia inaequalis*] and mildew (heavy infection) the S spray+karathane at 1 lb./100 gal. at pink bud, full bloom, and petal fall can be used. For low vol. applications of the above treatment 8–10 lb. wettable S+2½ lb. karathane/acre every 14 days to mid-July, or ½ this every 7th day, can be used, though the efficacy of such applications for scab control is uncertain.

Brown (A. G.). **The inheritance of mildew resistance in progenies of the cultivated Apple.**—*Euphytica*, **8**, 1, pp. 81–88, 1959. [Dutch summary.]

Further information is given from John Innes Horticultural Institution, Bayfordbury, Herts. [**37**, p. 696], on resistance to mildew (*Podosphaera leucotricha*) [cf. **38**, p. 265].

Paterilo (G. A.). Развитие черного рака в Яблоневых садах Молдавии в зависимости от экологических условий. [Development of black canker in Apple orchards in Moldavia in relation to the ecological conditions.]—Изв. молд. Фил. АН СССР [*Izv. mold. Fil. Acad. Nauk SSSR*], *1957*, 2–3, pp. 123–137, 1957. [Moldavian and English summaries. Abs. in *Referat. Zh. Biol.*, *1959*, 6, p. 211, 1959.]

In N. and S. Moldavia and in the Kody region apple canker [*Nectria galligena*: cf. **38**, p. 413] causes up to 62–64% loss. Spread is favoured by high temp. injury to the bark, pruning wounds, cracks, and frost damage. The taller vars., Candile sinap, Rosmarine white, Sarÿ-sinap, and Kalvile white are more resistant than the smaller vars.

Pratella (G. C.). **Phytophthora cactorum (Leb. et Cohn) Schröt., agente del marciume pedale del Melo.** [*P. cactorum*, the cause of foot rot of Apple.]—*Ann. Sper. agr.*, N.S., **13**, 2, pp. xlix–lx, 6 fig., 1 graph, 1959. [English summary. 16 ref.]

In 1958, 5-yr. old Imperatore and Abbondanza apple trees growing in the northern parts of the province of Ferrara developed a rapidly fatal die-back caused by collar rot (*P. cactorum*) [cf. **11**, p. 765; **35**, p. 831]. Cultural and morphological studies of the fungus are described. The disease is not considered likely to become widespread in Italy, where the climatic conditions are not favourable to it.

Negru (A.), Mircea (E.), & Crișan (A.). **Pleante gazde noi pentru Monilia fructigena Pers.** [New hosts of the fungus *Sclerotinia fructigena*.]—*Stud. Cercet. agron. Acad. Repub. rom., Cluj*, **8**, 1–2, pp. 93–98, 1957. [Russian and French summaries. Abs. in *Referat. Zh. Biol.*, *1958*, 23, p. 198, 1958.]

The newly recorded hosts are *Berberis vulgaris*, *B. sieboldii*, *B. canadensis*, *Sorbus aucuparia*, *S. dacica*, *Crataegus oxyacantha*, *C. subvillosa*, *Cotoneaster obtusa*, and grapes of Shassla doré var. Pathogenicity was established by inoculation with conidia from infected apples and *B. vulgaris*.

Moore (M. H.) & Edney (K. L.). **The timing of spray treatments for the control of storage rot of Apple caused by Gloeosporium spp.**—*Rep. E. Malling Res. Sta.*, *1958*, pp. 106–109, 1959.

Cox's Orange Pippin trees were sprayed over 2 yr. (1955–6) in mid-Sept. only, Aug. and Sept., or July, Aug., and Sept., with captan (0·1% active ingredient) [cf. **37**, pp. 47, 88]. Rotting due to *Gloeosporium* [*Neofabraea*] *perennans* and *G. album* in samples of the fruits was recorded at 4 serial inspections during storage at 37° F.

The mid-Sept. spray in both years gave a significant degree of control, which was augmented in 1955 by the additional mid-July spray only, and in 1956 by the mid-Aug. spray only, this variation probably being related to the rainfall preceding and following spraying. In the wet summer of 1956, when rotting by *N. perennans* was more severe, control from 3 sprayings was less satisfactory than in the drier preceding summer; in unsettled weather a reduction in spray intervals might be better.

McGlasson (W. B.) & Botting (G. W.). **Ripe spot in Statesman Apples. Results from spray treatments and storage tests.**—*J. Dept. Agric. S. Aust.*, **62**, 8, pp. 362–364, 1 fig., 1 diag., 1959.

Serious losses from ripe spot or 'target spot' (*Gloeosporium album*) [cf. **36**, p. 652] in stored Statesman and Golden Delicious were reported in 1956 and 1957. In control tests Statesman trees on 1 property were sprayed with thiram at 6 lb./100 gal. by turbo-mist sprayer. The apples were harvested on 22 Apr. and 13 May and stored at 31–32° F.: half of each set was removed on 17 Sept.,

the other on 21 Nov. and held 1 week at air temp. before examination. Spraying did not control ripe spot, but fruit picked on 13 May was more affected than that picked earlier, which also had a superior flavour.

Shrota (L. A.). Физиологические особенности Яблонь, болеющих хлорозом в условиях Чуйской долины. [Physiological features of Apple trees affected by chlorosis in the conditions of the Chu valley.]—32 pp., Institute of Botany, Academy of Sciences of the Kirghiz S.S.R., Frunze, 1958. Roubles 1.55. [80 ref.]

Chlorosis in apple and other trees in this region is attributed to Fe deficiency and increases with soil alkalinity. Chlorotic leaves contain a higher proportion of carotinoids to chlorophyll than do green leaves, synthesizing less sugar and pigment and more organic and amino acids. Transpiration is reduced and the Fe containing enzyme catalase is also affected. Reduction in photosynthesis results in the accumulation of ash constituents in chlorotic leaves and diminution in the stems. Water content is raised by the interaction of the various factors. The most effective control is obtained by injecting the upper parts of the root system with iron tannate.

Welsh (M. F.) & Keane (F. W. L.). **Virus diseases of Pear.**—Abs. in *C.P.S. News*, **11**, 2, p. 2, 1959.

Fruit pitting symptoms have been recognized in the interior of British Columbia on the pear vars. Bosc, d'Anjou, and Flemish Beauty. Bosc is affected by the [pear] stony pit virus [cf. **37**, p. 487], the disease in d'Anjou is of unknown origin. The Flemish Beauty disease was transmitted through Bosc (symptomless) to healthy Flemish Beauty and is therefore distinct from stony pit virus.

Posnette (A. F.) & Cropley (R.). **A selection of Williams' Bon Chrétien Pear compatible with Quince rootstocks.**—*Rep. E. Malling Res. Sta., 1958*, pp. 91–92, 2 pl., 1959.

Rootstocks of Quince A were grafted with scions of Williams' Bon Chrétien from an English, a French, and a Swiss source, the first 2 being free from any virus infection detectable by grafting to quince indicator plants, while the 3rd was infected by vein yellows [cf. **36**, p. 330] and bark necrosis [**38**, p. 152] viruses. After 2 yr. the structure of the graft unions differed, the English scions being highly incompatible, the French slightly so, and the Swiss compatible. Such unions were formed by the different scions on the same stock for 4 yr., suggesting that the cause of incompatibility, not being graft-transmissible, is not a virus infection. Bud mutation is probably the reason for the differences between the clones.

Issa (E.). **A 'mancha anelar' do Marmeleiro.** [Ring spot of Quince.]—*Biológico*, **25**, 3, pp. 64–67, 3 fig., 1959.

At the end of Feb. 1952 the author observed the ring spot symptoms, chlorosis, and malformation of the fruits on quince var. Portugal in an orchard near São Paulo, Brazil [cf. **38**, p. 152]. Infection was transmitted to healthy 3-month-old seedlings by grafting, but not to pear or apple. It is concluded to be of virus nature.

Scharif (G.). **Cercoseptoria cydoniae sp. nov. on Quince (Cydonia vulgaris L.) in Iran.**—*Trans. Brit. mycol. Soc.*, **42**, 1, pp. 33–39, 1 pl. (8 fig.), 2 fig., 1959.

C. cydoniae, producing 0–11-septate spores 5–119 × 1·3–2·5 μ, causes angular brown leaf spots on quince in Iran: hyphae fill the space between the epidermises, producing sporodochium-like structures (35–130 μ diam.) under the upper cuticle, and small mycelial knots under the lower epidermis at the stomata. A detailed description of the fungus on the host and in culture is given.

Baumann (Gisela). **Wirtspflanzen des Pflaumenbandmosaik-Virus in mittel- und norddeutschen Obstanlagen und Baumschulen.** [Host plants of Plum line pattern virus in central and north German orchards and nurseries.]—*Phytopath. Z.*, **35**, 3, pp. 277–291, 11 fig., 1959. [English summary.]

Investigations at the Institut für Phytopathologie, Aschersleben, Germany, proved *Prunus spinosa* and *P. triloba* to be new hosts of plum line pattern virus [cf. **36**, p. 705]. Shield grafting to sour cherry and mazzard seedlings and sap inoculation of cucumber plants indicated latent infection of plums by sour cherry Stecklenberg virus disease [? peach ring spot str.: **35**, pp. 373, 774]. Line pattern was not transmissible to cucumber or squash. Up to 3·5% of the plum rootstocks and vars. in nurseries [cf. **36**, p. 533] (some vars. up to 10%) are infected by plum line pattern virus, which is mainly due to the vegetatively propagated Myrobalan rootstocks. Many virus-free vars. and Myrobalan source trees have been established.

Millikan (D. F.). **The incidence of the ring spot virus in Peach nursery and orchard trees.**—*Plant Dis. Reptr*, **43**, 1, pp. 82–84, 1959.

At Missouri Agricultural Experiment Station, Columbia, random indexing of unbudded Lovell peach seedling stocks [cf. **38**, p. 154] to Montmorency and Shirofugen sour cherry indicators revealed about 16% infection by [peach] ring spot virus, indicating that seed sources must be taken into consideration as well as scions in any certification programme [cf. **38**, p. 154]. Incidence in peach orchard and nursery trees in Missouri ranged up to 20% in a newly established scion block.

Videnov (B.). Къдравост по Прасковата химична борба и устойчивост на сортовете. [Leaf curl in Peach—chemical control and resistance of varieties.]—Науч. Труд. М-во земед., Сер. растен. [*Nauch. Trud. M-vo zemed., Ser. rast., Sofia*], **2**, 1, pp. 13–24, 1957. [Russian and English summaries. Abs. in *Referat Zh. Biol., 1959*, 6, p. 211, 1959.]

At the Kyustendil Scientific Research Institute, Bulgaria, good control of *Taphrina deformans* was obtained in 1953–4 with 0·75% Bordeaux mixture 1:15 ISO, 1% nosprazen (a German Cu compound), and 1·5% thiovit. Applications should be made from leaf fall until budding time every year. All nursery seedlings should be treated at the same time and seedlings and young trees before transplanting.

Peterson (G. W.). **Transmission and latency of cherry necrotic ring spot virus in Prunus tomentosa.**—*Diss. Abstr.*, **19**, 8, p. 1907, 1959.

Inoculations at Iowa State College of *P. tomentosa* at various stages of development with dormant buds, open buds, and dormant bark of Fruitmorency cherry trees infected by [peach] necrotic ring spot (NRS) virus [cf. **38**, p. 217] required more than 4 days contact for transmission; root grafts between healthy and infected *P. tomentosa* were effective in 2 of 30 pairs of trees, stem grafts in 2 of 70, placing infected leaf tissue or cotton wool soaked in infected crude sap from Fruitmorency, in crude sap and sap free from leaf tissues from Gilbert Montmorency under bark flaps in 3 of 50, 20 of 20, none, and none, respectively. The results were not suggestive of mechanical transmission with the possible exception of the crude sap, which, however, could not be considered as mechanical, since compatible leaf tissue was present. It was also demonstrated by inoculating 10 seedlings with each of 18 sources of NRS virus [cf. **38**, p. 92], and 1 yr. later reinoculating 6 of the 10, 2 with the same source, 2 with a similar source, and 2 with a dissimilar source, that the virus can exist in a latent condition in *P. tomentosa*.

Wilks (J. M.) & Reeves (E. L.). **A comparison of the host reactions of K & S and little Cherry disease.**—Abs. in *C.P.S. News*, **11**, 2, p. 2, 1959.

Surveys conducted through the West Kootenay showed that K & S [virus] disease

[cf. **37**, p. 727] was present in most flowering cherry trees: also all the indexed trees of *Prunus serrulata* were found to be affected. The [cherry] little cherry [virus: cf. **36**, p. 332] was found in all the sweet cherry trees examined in this area, on which the symptoms of the 2 diseases were undistinguishable. Peach and choke-cherry [*P. demissa*] were immune from both diseases. The evidence presented indicated that these diseases are caused by the same virus.

Varŷpaeva (Mme A. G.). О биоэкологии возбудителя серой гнили косточковых в БССР. [On the bioecology of the causal agent of grey mould of stone fruit in B.S.S.R.]—Тр. Гродненск. с.-х. Ин-та [*Trud. Grodno sel.-khoz. In-ta.*], *1957*, 3, pp. 75–88, 1957. [Abs. in *Referat. Zh. Biol.*, *1958*, 23, p. 199, 1958.]

Investigations in 1951–56 at the Botanical Garden and the White Russia Fruit Research Station, showed that all cherry vars. were infected by *Monilia cinerea* [*Sclerotinia laxa*: **36**, p. 337]. A comparative study of resistance was carried out. From field and laboratory tests it was established that the fungus forms 3 conidial generations, the 1st appearing in Apr. Apothecia were not found. The fungus overwinters as mycelium.

Moore (M. H.), Crosse (J. E.), & Bennett (Margery). **Spray experiments on the control of bacterial canker of Cherry.**—*Rep. E. Malling Res. Sta.*, *1958*, pp. 96–102, 2 pl., 1 graph, 1959.

In this paper presented at the 4th International Congress on Crop Protection, Hamburg, Sept. 1957, the authors review (12 ref.) the research carried out over many years at East Malling on the control of cherry canker (*Pseudomonas mors-prunorum*) by spraying [cf. below].

Crosse (J. E.) & Bennett (Margery). **The effects of cotton seed oil on the control of bacterial canker of Cherry with an early autumn spray schedule of Bordeaux mixture.**—*Rep. E. Malling Res. Sta.*, *1958*, pp. 93–95, 1 graph, 1959.

In further work it was found that 3 applications of Bordeaux mixture (19 Aug., 2:3:100; 18 Sept., 4:6:100; and 15 Oct., 10:15:100) [**37**, p. 94] reduced the number of bacterial canker infections (*Pseudomonas mors-prunorum*) [**38**, p. 155] on cherry by more than 90%. Cotton seed oil prevented rapid defoliation by these sprays but had no apparent effect on the disease, either alone in water or with Bordeaux

Knight (R. L.), Keep (Elizabeth), & Briggs (J. B.). **Resistance in the red Raspberry to Amphorophora rubi (Kalt.).**—Abs. in *Proc. 10th int. Congr. Genet.*, **2**, p. 147, 1958.

Breeding against raspberry viruses at East Malling is concentrated mainly on vector resistance, since many viruses attacking raspberry in Great Britain are transmitted by *A. rubi* [cf. **37**, p. 491]. Resistance of Baumforth A to *A. rubi* is controlled by a single dominant gene A which confers high resistance to seedlings in the insectary and to mature plants in the field, and which is linked with the normal allele of a semi-lethal gene, *fr*. The cross-over value between them is approximately 3·3%.

Varney (E. H.), Moore (J. N.), & Scott (D. A.). **Field resistance of various Strawberry varieties and selections to Verticillium.**—*Plant Dis. Reptr*, **43**, 5, pp. 567–569, 1959.

At New Jersey Agricultural Experiment Station, New Brunswick, several of 50 strawberry vars. and selections tested on soil naturally heavily contaminated showed considerable resistance to *V. alboatrum* [**38**, p. 93], including Catskill, Vermillian, Md-US 1972, Md-US 2650, and NC 1759, but the susceptibility of some hitherto considered resistant, such as Blakemore and IVT 667-Juspa (from Holland) indicates the presence of new strains of the pathogen in the eastern United States.

Stover (R. H.). **Studies on Fusarium wilt of Bananas. IV. Clonal differentiation among wild type isolates of F. oxysporum f. cubense.**—*Canad. J. Bot.*, **37**, 2, pp. 245–253, 3 pl. (1 col.), 1 diag., 1959.

Further studies in Honduras [cf. **37**, p. 729] have shown that *F. oxysporum* f. *cubense* isolated from diseased rhizomes and pseudostems of Gros Michel bananas exists in 2 major groups or cultivars designated 'odoratum' and 'inodoratum' according to whether the cultures produce a distinctive odour after 4–8 days on various media. Of the 'inodoratum' group 3 clones, almost indistinguishable morphologically on peptone dextrose agar, were distinguished by cultural interaction and by pathogenicity tests (soil inoculation) in the field. Some clones of the 2 groups differed quantitatively in pathogenicity in the field, e.g. clone C from Honduras, limited in distribution, induced the most rapid disease spread and crop destruction, followed by clone E from Panama. In Honduras there was an association between the 'inodoratum' and 'odoratum' cultivars and the resulting syndromes; the former usually induced strong yellowing of still erect leaves, while the latter caused early leaf collapse at the petiole with little or no leaf yellowing. In the field, however, plants yellowing markedly do not always yield 'inodoratum' clones, and other factors are also involved in syndrome development.

It appears that the number of clones in nature is much less than those developing in cultures, and though apparent natural mutants occur occasionally, their scarcity suggests that they have but slight survival value.

Page (O. T.). **Fusaric acid in Banana plants infected with Fusarium oxysporum f. cubense.**—*Phytopathology*, **49**, 4, p. 230, 1959.

In this note from La Lima, Honduras [**38**, p. 533] a detailed account is given of the chromatographic technique employed to demonstrate the presence of fusaric acid in cultures of *F.o.* f. *cubense* and in diseased Gros Michel banana plants.

Beltrán (R.). **Relación entre la concentración de triptofano en los tallos de Olivo y la localización de los tumores bacterianos.** [Relation between the concentration of tryptophane in Olive branches and the localization of bacterial tumours.]—*Microbiol. esp.*, **11**, 4, pp. 401–410, 1958. [English summary of 5 lines. 13 ref.]

Recent studies at the Instituto 'Jaime Ferrán' de Microbiologia, Madrid, demonstrated the presence of indoleacetic acid produced by *Pseudomonas savastanoi* in tryptophane-containing media and in the bacterial 'knots' on olive branches. Hence it is postulated that these tumours arise in part under the influence of the acid, which is formed from tryptophane by enzyme action, in and immediately around the infected zones.

Fridlund (P. R.). **A latent virus of Hops detected by Cucumber inoculation.**—*Plant Dis. Reptr*, **43**, 5, p. 594, 1959.

This virus, found in the course of investigations at the Irrigation Experiment Station, Prosser, Washington, was transmitted to cucumber and hop by sap inoculation (Boyle's method) [**34**, p. 280]. From cucumber it failed to infect 35 other herbaceous plant types, nor was it transmissible from hop to 3 *Prunus* spp.

Legg (J. T.). **A mild strain of Hop mosaic virus.**—*Rep. E. Malling Res. Sta., 1958*, pp. 116–117, 1 pl., 1959.

Cross-protection evidence is presented that lethal and mild hop mosaic are caused by 2 groups of strains of the virus, severe and mild, the former being lethal to Golding. A number of Blattný and Osvald's hop mosaic diseases in Czechoslovakia [**30**, p. 75] can be classified in one or other, and Cairaschi's chlorotic mosaic in Alsace [**33**, p. 631] probably belongs to the mild group.

Wilson (J. F.). **Density, Defender, and Janus: three new wilt-tolerant Hops.**—*Rep. E. Malling Res. Sta., 1958*, pp. 110–115, 2 pl., 1959.

These new hops vars. tolerant of *Verticillium alboatrum*, the outcome of the 1st of several breeding projects, have been released: Density (D1) and Defender (D3) are both susceptible to downy mildew [*Pseudoperonospora humuli*] and require a thorough control programme. Janus (J2) is of average susceptibility, requiring only normal control measures; all 3 are tolerant of hop mosaic virus.

Orellana (R. G.). **Botrytis leaf blight of Ricinus communis L.**—*Plant Dis. Reptr*, **43**, 3, pp. 363–364, 1 fig., 1959.

An outbreak of leaf spot on castor beans caused by conidial *Botryotinia* [*Sclerotinia*] *ricini* [**3**, p. 377; **35**, p. 276] occurred at Florida Experiment Station, Gainesville, in 1958. Inoculations of 5 castor bean strains with isolates from Gainesville and Beltsville showed a variation in susceptibility and suggested that leaf reaction may be used for evaluating resistance.

Mohanty (N. N.). **Cercospora leaf spot of Sesame.**—*Indian Phytopath.*, **11**, 2, pp. 186–187, 1 fig., 1958.

In Aug. 1957, at the State Agricultural Research Station, Bhubaneswar, a severe leaf spot of sesame was found to be caused by *Cercospora sesamicola* Mohanty with spores indistinctly 2–7 septate, 20–120 × 2–2·8 μ. It differs from *C. sesami* [**24**, p. 219] in the uniformly brown angular spots, short, narrow, closely packed conidiophores, and narrow-cylindrical conidia.

Vergovskiĭ (V. I.). Некоторые особенности в развитии фузариоза на Базилике. [Some peculiarities in the development of fusariosis in Basil.]—Кр. Отч. н.-и. всес. н.-и. Ин-та масл. эфиромасл. Культ. [*Kratk. Otch. n.-i. vsesoyuz. n.-i. Inst. masl. efiromasl. Kul't.*], *1956*, pp. 195–197, 1957. [Abs. in *Referat. Zh. Biol., 1958*, 23, p. 201, 1958.]

The high temp. at which basil [*Ocimum*] seedlings are forced is mainly responsible for the extensive spread of fusariosis (*Fusarium* sp.) [see below] in nurseries in Krasnodar, U.S.S.R. The temp. in nursery soil should not exceed 20° [C.], basil must not be grown for more than 1 yr. in the same field, and thorough eradication of diseased plants is advisable.

Kvartskhava (Мме P. A.). К изучению инфекционного увядания (фузариоза) евгенольного Базилика. [On a study of the infectious wilting (fusariosis) in evgenol Basil.]—Тр. Сухумск. опыт. Ста. эфиромасл. Культ. [*Trud. Sukhumsk. opyt. Sta. efiromasl. Kul't.*], *1957*, 2, pp. 101–113, 1957. [Abs. in *Referat. Zh. Biol., 1958*, 23, p. 201, 1958.]

In the Abkhaz nurseries, U.S.S.R., basil [*Ocimum* sp.] is severely attacked by *Fusarium* sp. [see above] which causes longitudinal stripes on the stem and chlorotic leaves, which wilt and fall prematurely. The pathogen invades the plants through injured roots. Sources of infection are residues of infected plants and weeds, as well as infected young transplanting material and seeds. Other crops growing near infected basil showed no sign of infection. The pathogen proved specific to *Ocimum* spp.

Baruah (H. K.) & Raghavan (V.). **On factors influencing fruit-set and sterility in Arecanut (Areca catechu Linn.). III. On possible influence of air spora on the normal course of pollination and fertilization.**—*Mycopathologia*, **10**, 4, pp. 341–349, 6 fig., 1 graph, 1959.

In studies at Gauhati University, Assam, evidence was obtained that the stigmatic surfaces of the female flowers of the areca palm may be impacted by spores of fungi,

bacteria, and actinomycetes. The organisms found on the stigmatic surface, mainly spp. of *Penicillium*, actinomycetes, *Mucor*, *Alternaria*, *Cladosporium*, and bacteria, when grown in culture, exhibited a marked antagonism to or inhibition of the normal germination and growth of pollen grains. Hyphae were demonstrated in the stigma, and it is possible that enzymes or toxins secreted during growth by the above organisms may affect normal fertilization.

Medvedev (D. F.). Оценка посевных качеств Картофеля по энергии прорастания клубней. [Evaluation of the sowing quality of Potatoes according to the vigour of tuber germination.]—*J. agric. Sci., Moscow*, **4**, 4, pp. 135–138, 1959. [English, German, and French summaries.]

At the Kuban Selection Station, All Union Plant Breeding Institute, germination tests of local potato seed tubers and provenance of Rannyaya rosa (from North Caucasus), Lorch, Kalitinets, Apron, and Majestic from 1945–48 established that there is an inverse dependence between the vigour of germination and degree of degeneration caused by viruses. Tubers not sprouting until 7–9 days after the beginning of mass germination (after vernalization) yielded only half the amount from tubers sprouting on the 1st day. The tubers with greater vigour were much more resistant to [unspecified] virus diseases.

Bjormann (E. J.), Taubert (H.), & Wartenberg (H.). **Hydrolyseversuche an Tuberin aus gesunden und blattrollviruskranken Kartoffelknollen.** [Hydrolysis experiments with tuberin from healthy and leaf roll virus infected Potato tubers.]—*Phytopath. Z.*, **35**, 3, pp. 217–231, 2 graphs, 1959. [English summary.]

At the Institut für allgemeine Botanik, Friedrich Schiller University, Jena, Germany, tuberin from healthy tubers was hydrolysed by 6 N HCl more easily than that from leaf roll virus infected tubers [**36**, p. 721]. In the early stages of hydrolysis with 4 N KOH the same applied, but after 30 min. the relationship was reversed. Hydrolysis with 4 N KOH is always slower than with 6 N HCl. With N HCl or N KOH decomposition occurs more slowly but the relationships are still the same. In slightly warmed HCl tuberin from healthy tubers hardly dissolved at all whereas that from infected tubers immediately produced a swollen voluminous white precipitate. In cold KOH tuberins from both sources dissolve, but on warming slightly that from healthy tubers precipitates and that from diseased remains dissolved.

The formation of amino acids, traced by paper chromatography, showed that alkaline and acid hydrolysis differ only in the speed at which the amino acids appear.

Chattopadhyay (S. B.) & Das (C. R.). **Assessment of tuber transmission of leaf-roll and rugose mosaic of Potato in West Bengal.**—*Indian Phytopath.*, **11**, 2, pp. 150–152, 1958.

A preliminary sap inoculation test by the State Agricultural Research Institute, Calcutta, to determine the extent of infection in potato tubers by leaf roll virus [**38**, p. 371] and rugose mosaic [potato viruses X+Y: loc. cit.] showed that 54·5% of Darjeeling Red Round tubers from apparently healthy plants from Dhamatikar carried virus X and 18·1% virus A; 37·5% of tubers from symptomless plants at Noornagar gave plants with symptoms of rugose mosaic. Tubers from plants showing rugose mosaic symptoms in the 2 localities gave 55·5 and 40%, respectively, typical rugose mosaic plants, and plants grown from tubers from leaf roll infected plants showed 35·7 and 50% leaf roll symptoms. Thus healthy seeming plants may be virus carriers, while tubers from infected plants may not be.

Reichmann (M. E.). **Potato X virus. Part I. The size and size distribution of Potato X virus in Tobacco sap. Part II. Preparation and properties of purified, non-aggregated virus from Tobacco. Part III. Light scattering studies.**—*Canad. J. Chem.*, **36**, 12, pp. 1603–1611, 1 fig., 3 graphs, 1958; **37**, 1, pp. 4–10, 1 fig., 2 graphs; pp. 384–388, 4 graphs, 1959.

At the Canada Dept of Agriculture Research Laboratory, Vancouver, B.C., assuming an irreversible, random, end-to-end aggregation of a small percentage of potato virus X [**38**, p. 585] in tobacco sap, the flow birefringence parameters of such polydisperse systems were calculated and the extinction angles χ determined for different values of the ratio, gradient:rotary diffusion constant of non-aggregated virus preparations containing 0–15% by number of aggregated material. A particle length of 6,200 Å for the non-aggregated virus particle [cf. **35**, p. 118] was derived and an amount of 13–15% aggregated material estimated.

A semi-purified and fractionated preparation of the virus was also investigated and an av. particle length of 5,400 Å computed. This length was taken as the lower limit because of the possible contribution of small fragments.

The particles of potato virus X appear to be rigid, extinction angle-gradient measurements in the range 0·1–0 *M* phosphate buffer having yielded no evidence of flexibility.

When infected tobacco sap was dialysed against 0·05 M and then against 0·005 M Na citrate, no aggregation of the virus was detected after ultracentrifugation. The results of comparative flow birefringence measurements of virus preparations obtained by ultracentrifugation of untreated sap and that treated with various buffers showed that only versene and Na citrate prevented aggregation.

The N and P values of the purified, non-aggregated virus were estimated at $15{\cdot}7 \pm 0{\cdot}4$ and $0{\cdot}59 \pm 0{\cdot}02$%, respectively [cf. **18**, p. 269].

Data presented in the 3rd paper are consistent with a cylindrical model 5,400 Å long having a molecular weight of 35×10^6.

Feddersen (H. D.). **Facts about purple top wilt in Potato crops.**—*J. Dep. Agric. S. Aust.*, **62**, 8, pp. 357–360, 379, 4 fig., 1959.

In S. Australia purple top wilt (tomato big bud virus) [cf. **35**, p. 48; **38**, p. 418] occurred in mother 'seed' in the south-east and in 'seed' grown from Victorian 'seed' in the Adelaide Hills. In the 1956–7 season none of the 50 plants showing disease symptoms had spongy tubers, but some had excessive root development with numerous tiny tubers. Percentage sprout development in all these tubers after cool storage, and yields at the end of the season (tons/acre) were: no sprouts, 44·5% and 1·8 tons; very tiny, weak sprouts: 26·9 and 2·5; long, hairy, spindly sprouts, 16·5 and 2·3; and normal sprouts 12·1 and 14. In the 1958 season the tubers from the last group made good growth and produced a normal crop, whereas 85% misses occurred in the remaining 3 groups. The plants which remained green in a matured crop were those grown from purple top infected tubers. All the results indicated that the disease is tuber-transmitted [loc. cit.] in South Australia. The means recommended for control are: roguing infected plants, their tubers, and plants which remain green when the crop has matured; sprouting tubers before planting out and rejecting the unsprouted and those with weak or spindly sprouts; removal of nightshade (*Solanum* spp.) plants from the paddock; and the use of insecticides.

Valenta (V.). **Zwei bisher unbekannte Kartoffelwelke verursachende Viren aus Mitteleuropa.** [Two hitherto unknown viruses from Central Europe causing Potato wilt.]—*Phytopath. Z.*, **35**, 3, pp. 271–276, 2 fig., 1959. [English summary.]

From the Virology Section of the Czechoslovak Academy of Science, Bratislava,

it is reported that 2 potato plants were found in N. Slovakia showing wilt symptoms suggestive of [tomato] stolbur infection [**38**, pp. 248, 586] but which, on closer examination, proved to be caused by 2 previously unknown viruses, provisionally designated parastolbur and metastolbur. In inoculations with the former the symptoms on tomato and *Datura stramonium* were similar to those of tomato stolbur virus, while *Nicotiana rustica* plants produced a large number of side-shoots. Both these and the tops of leading shoots were severely yellowed. The somewhat reduced leaves were mostly rolled, while new leaves forming showed distinct vein-clearing, the terminal leaves often being completely yellow. The upward stretching flowers were very little altered, though somewhat smaller with yellowish to whitish calyx and corolla. Fruit did not form although there were no morphological changes of the floral organs. In these symptoms parastolbur differed from all other yellows viruses examined by the author (tomato stolbur, Czechoslovak and Canadian potato witches' broom, and Crimean yellows virus) [**38**, p. 135].

Metastolbur virus was isolated in autumn 1956 from a potato plant near Krivany, N. Slovakia, the same area in which potato witches' broom virus [loc. cit.] was isolated in 1955, and from which numerous outbreaks were reported in 1957. In 1956 and 1958 no potatoes infected by witches' broom were found there, and the only stolbur infection in 1955–58 was this single potato plant. The metastolbur virus was isolated from a grafting on a tomato plant, transmitted to several potato plants, and from these back to tomatoes. In comparison with the other yellows viruses examined by the author it was more difficult to transmit, its normal incubation period being 6–8 weeks, often longer. It differs also in its symptoms on tomato plants, which are often visibly retarded in growth, tending more upward than normal ('gothic' growth). Numerous axillary shoots developed but remained stunted, with few leaves. The plants, especially their tops, were strikingly coloured pink to violet, often with no green colouring at all. Finally the tops began to wilt and the plants then died rapidly. Apart from potato and tomato, the metastolbur virus is not known to have any other hosts.

PIDOPLICHKO (N. M.). (Editor.) Рак Картофеля. [Potato wart.]—152 pp., 25 fig., Ukrainian Academy of Science, Kiev, 1957. Roubles 4.85. [Numerous ref.]

This collection of papers, read at the Symposium on Potato wart disease (*Synchytrium endobioticum*) [**38**, pp. 273, 418] and its control in Kiev, Apr. 12–14, 1955, includes an introduction by N. M. PIDOPLICHKO (pp. 5–16) on basic problems concerning the study of wart disease and the development of control measures. S. B. GORLENKO & N. A. DOROZHKIN (pp. 17–26), discussing the biology of the causal agent, reviewed, in the light of both Russian and foreign investigations, the concs. of zoosporangia at different depths in soil, the effect of pH on their growth, and the effect of bios [inositol: **35**, p. 322], and especially aneurin, stimulating the growth of dormant zoosporangia.

E. A. GEGERMAN (pp. 27–41), describing the development of *S. endobioticum* and its correlation with the host, reported on cytological anatomical studies of warts, which helped to determine the character of tissue growth in susceptible vars., and the reaction of the plant to invasion. K. E. SHARIKOV (pp. 42–50), referring to some peculiarities of the quiescent zoosporangia and methods for their determination [cf. **36**, p. 55], reported that as colouring matters could not penetrate the wall of the zoosporangium, plasmolysis was the most suitable method [cf. **32**, p. 336]. B. I. BERSHTEIN & A. S. OKANENKO (pp. 51–64), noting some peculiarities of the N exchange in susceptible and resistant vars., reported on the disturbance of N metabolism and the increase of formation and movement of amino acids. In the infected susceptible var. the dry matter content was increased and the quantity of albuminoid and non albuminoid N almost doubled. In the infected resistant

Grentsmark a decrease of amino N occurs the 4th day after infection, but later (9, 12, 21 days) there was no such difference in either infected or healthy vars. Infection by and development of *S. endobioticum* is accompanied by protein decomposition in the mother tuber and an intensive flow of amino N towards the infected organs.

D. V. Lipsits (pp. 65–83), dealing with biochemical investigations of healthy and wart-infected potato plants, described the principle of tests based on the determination of the activity of different enzymes, the polyphenol combinations, and the dynamics of ascorbic acid and glutathione, the physiological properties of the plasma and the cell colloids, and the difference in metabolism in stem tissues of potato plants. Tubers of resistant Grentsmark and susceptible Valle were treated as follows: 480 were kept for 5 days in an atmosphere of 16–18% CO_2, controlled by the Orsat apparatus; 960 were kept in a chamber with H_2S over a range of 0·75–3%; 360 were infiltrated with 3% urea; and 420 tubers with ascorbic acid. The infection of tubers thus treated was effected by contact with fresh warts and a check on the development of the pathogen was made 5, 10, 13, and 21 days after infection. Tests were made on the leaves of young plants, on roots, stems, collar, and leaves during the budding period, and at a later stage on tubers only. The activity of the peroxidase and polyphenoloxidase were expressed by the 'purpurgallic number' (1 mg. purpurgallin forming in 1 g. wet wt. of tissue). It was found that polyphenol oxidase becomes more active in both resistant and susceptible infected vars. but the enzymes in the former were more active. Grentsmark plants possess more phenol compounds. Most infection (53·8%) developed in tubers kept in H_2S, followed by those infiltrated by ascorbic acid (36·6%). At the 21st day after infection the damage in the susceptible var. was 20%, with polyphenoloxidase increasing in contrast to a decrease in the resistant var. Peroxidase activity in roots in infested soil increased considerably. Infection in resistant and susceptible vars. alike causes a decrease in succindehydrogenase, especially in tubers kept in a conc. CO_2 atmosphere.

Infection of Valle tubers caused a decrease in pH whereas in Grentsmark the opposite occurred. Tubers kept in conc. CO_2 markedly increased in ascorbic acid (on the 21st day), but this decreased after urea infiltration in both vars. Glutathione increased markedly on the 10th day in susceptible diseased plants, whereas it remained unchanged in the resistant. The hydrolytic activity of the amylase decreased in both resistant and susceptible when infected. Infection caused a decrease of sugars in the susceptible and an increase in the resistant. The starch content in the susceptible decreased, but remained unchanged in the resistant.

S. I. Pashkar (pp. 84–96), in experiments on the dynamics of the polyphenol and glycoalkaloid solanin in healthy and diseased potato plants, investigated the role of solanin in resistance (still in progress). T. A. Reingardt (pp. 97–107), referring to the condition of the protoplasm and the cell colloids in the different potato vars. in relation to their resistance, reported on the increase of permeability of the protoplasm in susceptible vars., and a decrease of coagulation of the cell colloids by temp. or alcohol. N. A. Dorozhkin & S. V. Gorlenko (pp. 108–113), discussing agrochemical measures for the control of wart disease in White Russia [**38**, p. 419], recommended the introduction of resistant vars., rotation, and introduction of organic matter into the soil, emphasizing the use of fallow and summer planting, which should be done in this region between July 20–25. The spring planting gave only 16·4 centner compared with 113 c./ha. from the summer. Vernalization of seed tubers is also recommended. D. B. Rozenberg (pp. 114–121) in a paper on the chemical compounds and materials used for the control of wart listed 27 of 207 tested, with the dosage/ha. The degree of control obtained [not specified] varied considerably. Chlorpicrin [loc. cit.] at 4·15 tons/ha. in sandy soil and 4·98 in other

soils, and disinfection with formalin at 3 l./sq. m. are recommended. Minsk Experiment Station obtained good results by disinfection with caustic soda at 750 g./kg./15 l. water/sq. m. P. R. Leitsis (pp. 122–126), referring to the effect of chlorpicrin in soil wart, reported unsatisfactory results from a single application, but after 2 applications a regular dispersal of the gas was found at the surface and at the required depth.

Using the fluorescent method for determination of healthy potato vars. Mme V. I. Sadounikova (pp. 127–133) X-rayed 55 vars. in preliminary tests. Different vars. show different colours, but the bright blue fluorescence of infected areas of the tubers is quite distinct from the pale blue, yellowish, or greenish-blue due to varietal differences. This method has been adopted and applied with good results by the Leningrad Scientific Research Potato Station since 1954. A better picture is obtained by preliminary treatment of the tubers with fluorochrome diluted 1:1,000–1:10,000. Mme Z. I. Remneva (pp. 134–144), speaking on the use of vegetative hybridization to increase resistance [cf. **37**, p. 502], reported on the grafting of old potato vars. onto hybrids of the 1st generation, which decreased incidence 2 or 3 times. Such grafting, combined with summer sowing, is recommended as the best method for eradication of *S. endobioticum*.

P. A. Khizhnyak (pp. 145–151) summed up the basic trends and results of scientific-research work on potato wart in the specialized scientific research stations [loc. cit.]; in 1948 there were only 3 potato vars. resistant to the disease but in 1950, 27 vars. and hybrids were available and 114 in 1952. The history of the organisation of selection-research stations and the coordination of activities between the different stations in the Republics is reviewed and the overall plans for control of the disease described.

Hyre (R. A.), Bonde (R.), & Johnson (Barbara). **The relation of rainfall, relative humidity, and temperature to late blight in Maine.**—*Plant Dis. Reptr*, **43**, 1, pp. 51–54, 1 fig., 1 diag., 1959.

In Aroostock County, Maine, 3 methods of analyzing weather data in relation to the occurrence of *Phytophthora infestans* in potatoes [cf. **38**, p. 26] were investigated in 1958, a season favourable for blight. An Auchincruive self-calculating recorder [**32**, p. 501] was used to determine Beaumont periods; by a 90% R.H. method (Wallin, *U.S. Dep. Agric. Plant Dis. Situation Rep.* 28, 1957) favourable periods were rated for blight severity; and the 3rd method, used the previous year (*Plant. Dis. Reptr*, **41**, pp. 936–938), was based on rainfall and temp. data obtained from 4 stations, 10 consecutive days favourable to blight being required for a forecast. The 1st observation of blight and the estimated mean foliage infection of about 7% were quite accurately reflected by all the methods.

Thurston (H. D.). **The relative survival ability of races of Phytophthora infestans in mixtures.**—*Diss. Abstr.*, **19**, 6, p. 1156, 1958.

In greenhouse experiments at the University of Minnesota with mixtures of *P. infestans* race 0 with other races (1; 1,4; 2,4; 1,2,4; and 4) race 0 predominated or entirely displaced the other races after perpetuation of the mixtures in susceptible potato plants for 2–9 generations. Race 0 isolates were usually more infectious than the specialized races with which they were compared, and there were indications that race 0 was antagonistic to the other races. Water in which sporangia of all races had germinated reduced indirect germination of fresh sporangia. No effect of 1 race upon another was found when races were paired in all possible combinations on Lima bean agar.

A plot of Cobbler (R_0) was inoculated at the centre with races 1 and 4, and differentials (R_1 and R_4 genes) were planted throughout the plot; as the fungus spread the differentials were not as heavily infected as Cobbler. Of 23 random isolates

from Cobbler 20 were of race 0, 2 of race 4, and 1 of race 1. The origin of race 0 is not clear. In a field of Cobbler divided into 20 plots (60 × 66 ft.), each inoculated at the centre with 1 each of 5 races, plant size and density appeared more important in determining the spread of the fungus than the race with which any plot was inoculated. Nevertheless, in plants of comparable size race 2,4 spread faster, farther, and caused more defoliation than the others, with race 1 next; the least aggressive was race 0.

Umaerus (V.). **The relationship between peroxidase activity in Potato leaves and resistance to Phytophthora infestans.**—*Amer. Potato J.*, **36**, 4, pp. 124–131, 1959.

A chemical test to estimate resistance to *P. infestans* would be of particular use in a breeding programme combining field immunity and field resistance. At the Iowa Agricultural and Home Economics Experiment Station, Ames, re-examination of the Kammermann test [**31**, p. 79] showed that peroxidase activity in mature leaflets was positively correlated with field resistance in potato but not in *Solanum demissum* and its derivatives. In potato vars. with a high level of field resistance peroxidase activity was greater (50% or more) than in those with a low level. Young leaves and those from plants grown under strong light had less peroxidase activity and were more susceptible. Activity in plants infected by potato virus X was also 1·6–1·8 times greater than in virus-free plants grown from the same mother tuber; it is suggested that the increased resistance of virus-infected plants to *P. infestans* [cf. **31**, p. 454] may be due to this factor. The results indicate that field resistance in *S. demissum* may be a resistance to 'ingression', and that in *S. tuberosum* a resistance to 'invasion' (using Leach's terminology [**20**, p. 218]).

Storozhenko (Y. G.). Устойчивость к фитофторе различных по иммунности сортов Картофеля в условиях Сахалина. [Resistance to *Phytophthora* in Potato varieties with degrees of resistance in the conditions of Sakhalin.]—*J. agric. Sci., Moscow*, **4**, 4, pp. 132–135, 1959. [English, German, and French summaries.]

In tests over 8 yr. by the Agricultural Experiment Station, Sakhalin, U.S.S.R., of several scores of potato vars. resistant to *P. infestans* [**38**, p. 420], including Ural'skii, Krasnoufimskiĭ, Kameraz No. 1 (hybrid), Seyanets 6–103, 7–585, 998, and Moscovskiĭ, from the Moscow and Leningrad regions, none was immune; disease symptoms in the resistant appeared 15–30 days later than in the susceptible. The most resistant were Seyanets 7–585 and 998 with 20–40% infection compared with 100% in the local and susceptible var., but 7–585 proved a better yielder. Some of the resistant vars., e.g. Seyanets 998, became less resistant progressively until after 3 yr. they were as susceptible as the local susceptible vars., but after the 3rd yr. Seyanets 998 was again one of the most resistant. The yield of the resistant vars. exceeded by 34–73·2% that of the susceptible. The tubers from the resistant vars. possessed good commercial qualities, had high starch content, and were less susceptible to fungal diseases.

Gaertner (A.). **Versuche zur künstlichen Kultur von Phytophthora infestans de Bary. I. Bedarf und Wirkung einiger anorganischer Salze im Nährmedium.** [Experiments on the artificial culture of *P. infestans*. I. Requirement and action of some inorganic salts in the nutrient medium.]—*Arch. Mikrobiol.*, **32**, 3, pp. 261–269, 1 fig., 1959.

The opt. conc. of iron ($FeCl_3.6H_2O$) in silica gel+potato decoction used for the culture of *P. infestans* [**38**, p. 447] potato race 4 at the Institut für Pflanzenpathologie und Pflanzenschutz, University of Göttingen [**37**, p. 370], was found to be $2{\cdot}6 \times 10^{-4}$ M. A plentiful supply of Ca in the form of $Ca(NO_3)_2$ and $CaSO_4.2H_2O$ is

of great importance for growth. Subopt. doses of Ca may be replaced to some extent by $MgSO_4$. With a sufficiency of Fe the vigour and aggressiveness of the fungus were maintained through 87 subcultures without recourse to the natural host.

Guntz (M.), Hascoet (M.), Ventura (E.), & Arnoux (J.). **Influence de quelques produits anticryptogamiques sur le rendement de la Pomme de terre : action fongicide et action physiologique.** [The influence of some fungicidal products on the yield of the Potato: fungicidal and physiological action.]—*Ann. Épiphyt.* **9** (*1958*), 4, pp. 517–550, 6 graphs, 1 diag., 1959. [33 ref.]

Spraying tests were carried out in 1954 by the Station Central de Pathologie Végétale, Versailles, on Viola, Bintje, and Ackersegen simultaneously in localities either favourable or unfavourable to blight [*Phytophthora infestans*: cf. **37**, p. 306]. Bordeaux mixture (2%) reduced yield by 10%; 65% zineb and 50% were variable in action; neither was depressive and occasionally they increased yield. In 1955 only Bintje was used in 3 areas, of which 1 was highly favourable to infection; 5 products were used (at 3 different dosages). There was no significant difference between them, or the untreated. In 1956 (again on Bintje only) Cu materials were compared with the organic compounds and mixtures, and zineb and copper oxychloride were used at different dosages and with different frequencies of application.

The results showed that copper products gave the best foliage protection, but were markedly phytotoxic, especially as the Cu content increased; the addition of mineral oil to copper oxide increased fungicidal efficiency and toxicity. Cu toxicity did not remain constant from one season to another. Zineb (65%) had no unfavourable effect on yield and sometimes favoured foliage development. Its fungicidal value was sometimes, however, less than that of the Cu compounds, as its persistence was shorter.

It is concluded that the choice of a material to control *P. infestans* depends on the climatic conditions (especially the rainfall) of the area concerned, the age of the plants, and the stage of development of the disease. In general, zineb should be used at the beginning of the season, and Cu products later on.

Kravtsova (Mme G. P.). Роль клубневой инфекции в развитии обыкновенной парши Картофеля. [The role of tuber infection in the development of Potato common scab.]—Сб. Ин-та прикл. Зоол. Фитопат. [*Sborn. Inst. prikl. Zool. Phytopath.*], *1958*, 5, pp. 237–244, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 9, p. 211, 1959.]

In the Leningrad region, U.S.S.R., the complex of common scab is caused by *Actinomyces* [*Streptomyces*] *globisporus* [**38**, p. 161], *A* [*S.*] *setonii*, *A.* [*S.*] *longisporus*, *A.* [*S.*] *salmonicolor*, *A.* [*S.*] *violaceus*, and *A.* [*S.*] *griseus*. It was established that infection of the tubers from soil is 3 times greater than from tubers. When tubers suspected of infection were treated before sowing losses from scab were less but plants from both healthy and treated tubers can become infected in the soil.

Kharitonova (Mme Z. M.). Биология и вредоносность гриба **Rhizoctonia solani Kuhn** (возбудитель черной парши Картофеля). [Biology of and damage by the fungus *Corticium solani* (causal agent of black scurf of Potatoes).]—Сб. Ин-та прикл. Зоол. Фитопат. [*Sborn. Inst. prikl. Zool. Phytopath.*], *1958*, 5, pp. 206–221, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 9, p. 211, 1959.]

Potato black leg [*Erwinia phytophthora*: **37**, p. 593] and late blight [*Phytophthora infestans*: loc. cit.] infections in U.S.S.R. usually start in *C. solani* cankers [**38**, p. 220].

Infection in the etiolated shoots during storage and later in the stem and roots has a highly toxic effect on the tissue cells of the tubers.

Hirst (J. M.) & Salt (G. A.). **Oospora pustulans Owen & Wakefield as a parasite of Potato root systems.**—*Trans. Brit. mycol. Soc.*, **42**, 1, pp. 59–66, 2 pl. (9 fig.), 1959.

An abstract of this information from Rothamsted Experimental Station has already been noticed [**38**, p. 29]. The fungus isolated from brown lesions in the cortex of root systems of Majestic potatoes in 1951 was identical morphologically with *O. pustulans* isolated from tubers [**36**, p. 814]. Tuber yield was little affected despite severe damage to roots, which, however, constitute a source of further infection. Previous potato cropping or infection of seed tubers have little effect on the infection of the root system, nor is this related to the appearance of macroscopic symptoms on the tubers.

Mooi (J. C.). **A skin necrosis occurring on Potato tubers affected by black dot (Colletotrichum atramentarium) after exposure to low temperatures.**—*Europ. Potato J.*, **2**, 1, pp. 58–68, 1 fig., 1959. [German and French summaries.]

At the Institute of Phytopathological Research, Wageningen, Netherlands, Eigenheimer potato tubers, bearing black dot lesions of *C. atramentarium* [**36**, p. 348] were exposed to −1·1° C. for 14 days; most of them remained unfrozen. Many developed necrotic lesions similar to those described by Wenzl [**36**, p. 208] and Braun [**37**, p. 417] as 'skin necrosis', but no lesions formed on tubers free from black dot at the outset. The fungus would thus appear to be a primary pathogen, and it must be supposed that the tissue adjacent to the black dots is particularly susceptible at temperatures below 0°.

In tubers stored in a dry atmosphere the black dot lesions did not spread, but they did so under humid conditions; the latter tubers, exposed to cold treatment, developed far more necrotic lesions than could be attributed to the greater number of black dot lesions initially present. It was assumed that the tissue adjacent to the actively spreading black dot lesions was more severely affected by toxins excreted by the fungus. Skin necrosis symptoms closely resembling those of Wenzl and Braun also appeared on tubers stored at temps. which never fell below 0°. The work is being continued.

Hooker (W. J.) & Duncan (D. T.). **Storage rot susceptibility of Potato tubers exposed to ionizing irradiation.**—*Amer. Potato J.*, **36**, 5, pp. 162–172, 10 graphs, 1959. [16 ref.]

At the Plant Pathology Dept, Michigan State University, East Lansing, when Sebago potato tubers were exposed to ionizing radiation from a cobalt 60 source and observed for the incidence of storage rots incited by inoculation with *Erwinia carotovora* [**36**, p. 785] and *Fusarium sambucinum* f. 6 [*Gibberella cyanogena*: **36**, p. 267], no evidence was found that the irradiation either reduced rot incidence or enhanced the effectiveness of normal defence reactions in the tuber. The incidence of ring rot (*Corynebacterium sepedonicum*) [**37**, p. 737] developing in naturally diseased tubers was not modified by irradiation except where the symptoms were masked by high incidence of soft rot (*E. carotovora*) following severe irradiation injury. The incidence of miscellaneous, naturally occurring rots, including the above, in non-inoculated tubers was highest at the high levels of irradiation (500 kilorep), and grew less as this was reduced. These trends seen in tubers stored at 68–70° F. for 129 days were the same as at 34–40° for 365 days.

The incidence of rot in tubers wounded and inoculated with *E. carotovora* and *G. cyanogena* was considerably higher than in wounded uninoculated; in both the incidence and rate of spread of rot was increased at higher irradiation. Measurement of defence reactions in storage at 70–75° indicated that at least some such reactions were operating within 3 days after intensities of 15 kilorep and below, and within 9 days after up to 135 kilorep.

Reviewing the observations of other workers the authors suggest that ionizing irradiation influences susceptibility to rot by modifying 2 different reactions. One was delayed in appearance and rather permanent, especially at low levels of irradiation, and rot progressed throughout the storage period faster than in non-irradiated controls. The 2nd was apparently temporary and the tuber recovered in a few days, but in the meantime delay of normal wound healing resulted in a degree of susceptibility immediately after irradiation greater than in the controls.

Reifman (V. G.). Поражаемость сортов Картофеля ржавой пятнистостью в Приморском крае. К вопросу о причинах устойчивости сортов Картофеля к ржавой пятнистости в Приморье. [The incidence of rust spot in Potato varieties in the Primorye region. On the question of the causes of resistance in Potato varieties to rust spot in Primorye.]—Вопр. сельск. Х-ва Дальн. Востока [*Vopr. sel. Kh-va Far East*] 1, pp. 45–55, 57–63, 1956. [Received July 1959.]

Of 21 potato vars. tested for resistance to [internal] rust spot in the Vladivostok, Mikhaylovka, Spassu, and Turan regions, U.S.S.R., in 1948–52, Berlihingen, Zikingen, Rosafolia, and Peredovic were the most severely affected. The most resistant were Priekul'skii (nil) and Ostobote (0·2% in Mikhaylovka); Cobbler, Severnaya Roza, Imandra, Kuzier, and Smyslovskii are also recommended. Weather fluctuations during tuber development and cultivation on heavy clay soil increased the damage [cf. **37**, p. 737].

The 2nd paper deals with control experiments by the Far East Filial of the Soviet Academy of Sciences. Berlihingen potatoes planted in July developed an av. of only 1·3% rust spot in 3 yr. compared with 48·7% in those planted in mid May. From other regions in U.S.S.R. similar results were obtained. Incidence was inversely proportional to depth of planting.

Mulching with sawdust decreased incidence to 1% (untreated 40%). An inadequate P supply increased it; the resistant Paul Wagner reacted only slightly to fertilizers whereas yield of the susceptible Berlihingen was increased by 20%. It is concluded that under local conditions the only severely affected vars. are those which cannot utilize complex P compounds.

Daines (R. H.). **The influence of bedding stock source, plant bed temperature, and fungicide treatment on the development of black rot of Sweet Potato sprouts and on the resulting crop during storage.**—*Phytopathology*, **49**, 5, pp. 249–251, 1 graph, 1959.

In tests over a 5-yr. period at New Jersey Agricultural Experiment Station, New Brunswick, *Ceratocystis fimbriata* [**37**, p. 179 *et passim*] in Jersey Orange sweet potatoes, either taken from an infected source or inoculated by dipping in a spore suspension and then held for 18 hr. at 70–75° F. and 90% R.H. before planting, could not be adequately controlled by fungicides when the potatoes were planted in electrically heated beds at 75°. With a bed temp. of 85°, however, and particularly at 90°, incidence was markedly less, and dip treatments reduced it to a low level or nil. Mercurial fungicides were the most effective, carbamates least, and of the non-mercurials dyrene was the most promising. The max. temp. (90°), while giving the best control, tends to make sprouts too soft for transplanting and encourages Java black rot [*Diplodia tubericola*: see below]; 85° is therefore the best in practice.

Daines (R. H.). **The effect of plant bed temperature and fungicide treatments on the occurrence of Java black rot disease of Sweet Potato sprouts.**—*Phytopathology*, **49**, 5, pp. 252–254, 1 fig., 1 graph, 1959.

In a 3-yr. study of the effect of this disease (*Diplodia tubericola*) on sweet potato [**18**, p. 789 and above] inoculated roots were held for 18 hr. at 85° F. and R.H. 90%.

After planting out disease development was highest at 90°, intermediate at 85°, and least at 75°. Mercurials were the most effective dips, carbamates least, and dyrene and captan intermediate. Formerly, the disease was thought to occur only in storage [**14**, p. 528] but it is revealed here as a serious problem in plant beds where the macroscopic symptoms on the sprouts appear identical with those of *Ceratocystis fimbriata*, except for the presence of pycnidia in lieu of perithecia.

NEWSAM (A.). **Pathological Division.**—*Rep. Rubb. Res. Inst. Malaya, 1956*, pp. 40–46, [1959].

In this report [cf. **38**, p. 486] it is stated that one major experiment nearing completion not only confirmed the beneficial effect against root disease [*Fomes lignosus*, *F. noxius*, and *Ganoderma pseudoferreum*] of poisoning with sodium arsenite old stumps left in the ground when replanting, but also made it possible to compare different poisoning methods. In general, poisoning reduced the incidence of the disease in the young stand by 60%, as compared with no poisoning. A new experiment was started to test n-butyl 2,4,5-T as an alternative to sodium arsenite; after 6 months there was little to choose between the 2 treatments in point of their ability to kill the roots. Another experiment approaching completion revealed how surface timber can spread infection.

Tests were completed on a series of commercially produced tar-acid fractions [**36**, p. 124] against mouldy rot [*Ceratocystis fimbriata*], which was brought under control after 9 applications, using a conc. non-injurious to the bark.

The incidence of pink disease [*Corticium salmonicolor*: see below] on clone RRIM 501, notably susceptible when young, was used to assess the distribution of the disease, which was ascertained to be virtually non-existent on coastal alluvial soils.

HILTON (R. N.). **Pink disease of Hevea caused by Corticium salmonicolor Berk. et Br.**—*J. Rubb. Res. Inst. Malaya*, **15**, 5, pp. 275–292, 13 fig., 1 col. map, 1958. [57 ref.]

An account is given of the present knowledge concerning pink disease (*Corticium salmonicolor*) [cf. **38**, p. 32] of rubber, with special emphasis on recent field observations in Indo-China and Malaya. The results of further experiments are presented and work published since 1915 is summarized. The chief aspects of the subject dealt with comprise geographical distribution [map 122], distribution within Malaya, economic importance, symptoms, the causal organism, pathogenicity, resistance and susceptibility, effects of environmental factors, and control. The current advice is to discontinue pruning and to rely on fungicides for control [loc. cit.].

HUTCHISON (F. W.). **Defoliation of Hevea brasiliensis by aerial spraying.**—*J. Rubb. Res. Inst. Malaya*, **15**, 5, pp. 241–274, 7 fig., 8 graphs, 1958.

A report is presented of an investigation into the possibilities of defoliating rubber trees by the application of a herbicide from the air (by de Havilland Beaver aircraft) as the only possible means of attempting eradication of South American leaf blight [*Dothidella ulei*: cf. **35**, p. 716; **38**, p. 275] should it appear in Malaya. Screening tests carried out with a large number of materials established the superiority of n-butyl 2,4,5-T as a defoliant, *Hevea* rubber being highly sensitive to it. Field trials showed that the conc. is not critical, but that good results follow the application of 5% (80% acid equivalent) in 3 gal. gas oil/acre. After 1 application the treated trees remained without leaves for 4–6 weeks. Higher concs. did not give better results since they caused defoliation before the hormone had been completely translocated. Difference in the rates of application gave little difference in defoliation but exerted a marked effect upon the rate and amount of refoliation. It was not possible to compare closely various rates/acre applied by boom and

nozzle gear or by rotary brushes, but with the latter 3 gal./acre was more effective than a lower rate, the results being equally effective with the smaller drop sizes produced by the brushes.

Pentachlorophenol included in the defoliant in quantities likely to prove lethal to *D. ulei* resulted in premature leaf fall and earlier refoliation, but it is recommended that it be applied separately on the day after defoliant treatment.

REITSMA (J.). **Progress in the control of bird's eye spot of the Hevea Rubber tree.**—15 pp., 9 fig., N.V. Fabriek van Chemische Producten, Vlaardingen, P.O. Box 69, Holland, [? 1959].

In Sept. 1948 a destructive outbreak of leaf blight (*Helminthosporium heveae*) [cf. **33**, p. 257] caused severe defoliation in rubber nurseries near Bogor. Surveys showed the disease to be generally present in all the nurseries visited in the Bogor, Tjiandjin, and Bantam areas of West Java. Leaf blight has since increased every year in Java and has also been reported to be of economic importance in Sumatra [cf. **3**, p. 300] and Kalimantem-Barat (W. Borneo). This increase is in accordance with observations in Malaya [**30**, p. 541].

The circular lesions on the leaves may attain 6 mm. diam. 3–4 weeks after initial infection and plants repeatedly attacked may become completely defoliated and die. In young plantations terminal growth may be suppressed.

In spraying and dusting tests on 4-months-old seedlings where infection was heavy, 3 treatments being given at intervals of 1 week, S and Cu dusts did not give control, while copper oxychloride was only slightly effective and Bordeaux mixture frequently caused burning of the tender foliage. Triscabol [cf. **30**, p. 631] and trifungol [loc. cit.], however, gave satisfactory control. In July 1954 nurseries in West Java were heavily attacked and became severely defoliated. From mid.-July until the end of Sept. 0·25% triscabol applied at intervals of 2 weeks enabled the rapid recovery of defoliated seedlings which were kept almost free from new infections. In the last week of Sept. rapid terminal growth started with successive new flushes and the spraying was repeated weekly for 6 weeks. At the end of Jan. 1955 85% of the sprayed seedlings were used as rootstocks for buddings, as against only 20% in the untreated plots.

In a further experiment buddings were sprayed with 0·25% triscabol and trifungol separately and together (18 g.+7 g./10 l. water). In conditions of severe infection trifungol gave much less effective control than triscabol or the combination spray. It is concluded that in a season in which infection is slight a combined spray at intervals of 2 weeks will give satisfactory control, but if infection is likely to be severe 0·25% triscabol at weekly intervals is recommended.

SHAW (DOROTHY E.). **A Deightoniella disease of Saccharum species.**—*Papua & N. Guinea agric. J.*, **11** (*1956*), 3, pp. 77–81, 2 pl., 7 fig., 1959.

A leaf disease called 'veneer blotch' caused by *Deightoniella papuana* Shaw is reported on sugarcane, *Saccharum robustum*, *S. spontaneum*, and *S.* sp. in Papua, New Guinea, New Britain, and the British Solomon Islands Protectorate. The symptoms on all hosts are similar, and begin on any part of the leaf lamina as a small oval spot, light green to straw coloured, with a distinct thin red-brown border which becomes flanked by 2 longitudinally elongated lesions resembling wings. Successive wings then appear, flanking the 1st pair, until sometimes 12 pairs are formed; on the upper surface they are outlined with a thin dark red border. The lesion is at first light green, then greeny-grey or straw coloured, and finally light brown. On the under surface conidiophores, arranged in more or less straight rows, and 39–70 (90)×6–8 μ, form a dense black pile, and occasionally appear on the upper surface; the conidia are 15–20×15–18 μ. The genus [**36**, p. 666] is emended to include spp. with amerospores.

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